A Comparative Study of Industry Factors in Emerging and Developed Stock Markets

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CANDIDATE'S STATEMENT

I, Hua JIN, declare that this thesis is the original work of the author. All sources, authors or other materials referenced in this thesis have been accordingly acknowledged.

金华 JIN HUA

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ABSTRACT

This thesis examines the impact of industry, country and regional factors on the variation in the realized market returns and volatilities of 33 major stock markets as in the FTSE All-World Index Series$^{TM/SM}$ during the period of 1994-2003. The dummy variable regression model of Heston and Rouwenhorst (1994) has been employed and further extended to extract each factor from the realized industry returns available in each market.

Along with the conventional methodologies used in the existing studies, such as the variance ratio analysis, some alternatives are also provided as a complement to the analysis. They can be summarized as follows. First, the sample has been divided into two sub-samples consisting of either eleven developed (stock) markets or 22 emerging (stock) markets. Thereby, the sensitivity of each factor to the different country grouping strategies can be examined. Further, following the argument by Griffin and Karolyi (1998) on the impact of the industry classification on the strength of the industry factor in each market, each factor has also been extracted from industry returns under two industry classification systems with different granularities as a robust check of the results.

Second, inspired by the work of Roll (1992), two regression-based analyses are devised to examine the contribution of each factor to market performances. That is, with the assumption that the estimated factor loadings for industry, country and regional factors can be roughly regarded as returns on three factor mimicking portfolios with their respective maximum exposures to one of the three factors, each factor has been augmented into the International Capital Asset Pricing Model (ICAPM) to examine their contributions to the average market returns. In addition, with its mean equation specified as the ICAPM model, each factor has also been added to the conditional variance equation of EGARCH (1, 1) model to examine the contribution of each factor to the variation in the unsystematic risk component (or market-specific volatility) that cannot be explained by the variation of the world market risk premium alone.

Finally, following the study of Cavaglia, Brightman and Aked (2000), a comprehensive analysis based upon time-series plots within a rolling window of 36 weeks is also provided. Thereby, each factor has been examined within a dynamic framework. Unlike their study in which only the value-weighted aggregate factors are examined, this thesis has employed two weighting schemes, i.e., an equally- and a capital-weighing schemes, to aggregate each factor with different assumptions on the portfolio construction strategies of international investors. Moreover, the dynamics of each factor has also been examined in association with the U.S. business cycles that are documented by National Bureau of Economic Research (NBER), with the assumption that U.S. business cycles can be roughly used to represent the global business cycles.

Major findings in this thesis can be summarized as follows. With a focus on the contribution of industry and country factors to the market performances of 33 major stock markets, the empirical results in Chapter 5 generally support the recent evidence that the industry factor has increased in its importance or even has dominated the country factor in some periods in explaining the varied market performances during the period of 1994-2004. Interestingly, the 36-week time-series plots indicate that the periods during which the industry factor dominates the country factor coincide with the recovery/expansion phases of the business cycles. This evidence is more prominent among developed markets than is among emerging markets. For emerging markets, the country factor still dominates the industry factor during the most of the sample period. The superiority of the country factor is more pronounced during the crisis period of 1998-1999, during which most emerging markets experienced a strong blow from the Asian Financial Crisis of 1997-1998. The time-series plots of the aggregate factors that are estimated from a sub-sample of 22 emerging markets show that this evidence is unfolded on a regional basis.

With a focus on the regional factor that is estimated from an extended two-stage dummy variable regression model, empirical results in Chapter 6, targeting a subset of 20 emerging markets of Asia, Europe and Latin America, suggest that the regional factor is more pronounced among European emerging markets, followed by Asian emerging markets. The country factor still dominates the regional and industry factors, although it is less extreme than the case in Chapter 5 where only industry and country factors are considered. That is, the regional factor is also important but second to the country factor. The industry factor, strictly estimated from all 33 markets to ensure its global nature, is the least important factor among the three. Yet, time-series plots have shown that the industry factor dominates the regional factor during the two recovery/expansion phases of the business cycles. This evidence is less pronounced during the only recession/contraction period of 2001 as covered in the sample.

Overall, the empirical results in this thesis suggest that the factor structure driving the international security returns has changed in recent years. Global factors, such as world market and industry factors, play an increasingly important role in developed markets and in some emerging markets with advanced economies. This implies that these markets are more integrated into the world capital market during recent years than used to be. These results also have important implications regarding the international portfolio diversification: Cross-market diversification is still a better choice than the cross-industry diversification, especially among emerging markets. The evidence in developed markets, however, suggests that the ignorance of the industrial mix may lead to a significant loss of diversification benefits. On the other hand, regional proximity seems to be an important factor in emerging markets due to the increased coordination in macroeconomic policies and international trades at the regional level. Furthermore, the superiority of each factor in each market may be related to the global business environment.

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CHAPTER I

INTRODUCTION

1.1 Introduction

Asset pricing models, such as the Capital Asset Pricing Model (CAPM) of Sharpe (1964)-Lintner (1965) or Arbitrage Pricing Theory (APT) of Ross (1976), have been in existence for a long time. Empirically, however, these models fare poorly. As a result, decades' efforts have been made by both academics and investment practitioners trying to discover the factor structure and the mechanism that drive stock market performances. Early studies in international finance, for example, Solnik (1974), have demonstrated that the potential gains from an international portfolio are mainly from a diversification across markets rather than a diversification across industries. In general, both theories and empirical studies suggest that the determinants of expected international security returns may be from a universe of pre-specified macroeconomic and/or market-wide variables.

Over recent years, one of the most exciting features of the development in the world economy is the globalization of economic activities across national borders. Omae (1985), for example, considers the resultant global economy consisting of three regional economic blocs, or "Triad Power": the U.S.-led North America, Japan-dominated Asian bloc, and the European Community or the Euroland. Coupled with this trend, the cross-market correlations during recent years, especially during the1990s, between developed markets (Longin and Solnik (1995)), between emerging markets (Longin and Solnik (2001)) and between developed and emerging markets (Bekaert and Harvey (2002)) have increased. As outlined in Häusler (2002), such a significant increase in correlations between world capital markets is mainly due to (1) advancements in information and computer technology; (2) the globalization of national economies following cross-border business activities of multinational companies; (3) the liberalization of national financial and capital markets (e.g., Henry (2000)); and (4) the competition among financial intermediaries. Some researchers interpret the increased correlations between major capital markets as the evidence in support of the integration of world capital markets.

Together with the increased integration of world capital markets, the factor structure governing the return generating process in each market has also been changing. The explanatory power of local factors may concede to global factors, such as global industry factors. As advocated in Weiss (1998):

> As the importance of national borders decreases, sector allocation strategies will become more appropriate and more valuable in global investing than country allocation strategies. An institutional investment product that not only recognizes this inevitability but capitalizes on it has bright future (p.8).

Coupled with the globalization of the world capital market, the fundamentals that shape the stock market performance may also shift from local factors to a set of factors with more global profiles. This study recognizes this fundamental change in the factor structure and, in conjunction with previous studies, explores the evolutionary nature of this globalization trend within the dimensions of industry, country and regional factors.

1.2 Purposes of the Study

In recent years, there is a growing body of literature in international finance attempting to identify the factors that account for the variations in international security returns and volatilities. The answers provided in existing studies are not satisfactory for several reasons. First of all, international asset pricing models (IAPMs) are derived under a strict set of assumptions regarding the market clearing conditions and the rationality of the investors' behavior therein. Unfortunately, in the real world, the market is far from perfection. The assumptions of IAPMs are quite often violated and the explanatory power of these models is accordingly discounted when applied to the real-time financial data. Secondly, asset pricing theories suggest that there may be a multi-factor structure driving the international security returns without the identification of the priced factors. As a result, the list of potential candidates for the priced factors is a long one as there are so many *pre-specified* variables available for examination and related to the security returns (Chan, Karceski and Lakonishok (1998)).

In this thesis, a simplified dummy variable regression model has been employed to a sample of 33 major stock markets in order to examine the relative contribution of industry and country factors to the variation in the international security returns and volatilities, which are two important input variables for constructing international portfolios. This model utilizes a relative small number of collective variables to represent world, country, and global industry factors. One of the advantages is that all these proxies are estimated from the realized security returns themselves in a Fama and MacBeth (1973) style cross-sectional regression. In addition, this approach avoids selecting or constructing an arbitrary collection of proxies for local and global factors.

As pointed out in the work of Cavaglia, Brightman and Aked (2000) and Baca, Garbe and Weiss (2000), the contribution of country or industry factors to security returns are determined, in part, by the degree of integration of that market with world capital market. As a result, final conclusions regarding the relative strength of the two factors in a market are sensitive to the markets sampled in each study. Studies that have incorporated a sizable number of segmented markets, such as that of Griffin and Karolyi (1998), are expected to find that the country factor contributes more to the variation in security returns than those studies with a focus on developed markets that are integrated with the world capital market. In this study, both emerging (22 in total) and developed markets (11 in total) are included in the sample. The number of cross-sectional industry returns for each type of market is almost identical to each other. Therefore, the dataset provides an ideal laboratory to directly address the integration issue in terms of the importance of each factor in market performances.

In international finance, conventional wisdom shared among academics and investment practitioners is that: During 1990s, in addition to the increased integration of world capital markets, cumulative evidence has shown that there is also an increasing integration of capital markets at the regional level, either as a result of closer economic corporation within the region, like NAFTA in North America and ASEAN in Southeast Asia (Grinblatt and Titman (1983)), or as a result of the "contagion effect"[1] (see Claessens, Dornbusch and Park (2001) for a survey). So far, most empirical studies have focused on the contribution of industry and country factors to the market performance without explicit consideration for the regional effect. Given the increasing economic and financial integration at the regional level, it is also necessary to recognize and investigate the possible contribution of the regional effect to the international security returns in emerging markets.

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[1] Controversies exist in this area of research regarding the definitions of contagion and the methodologies used to measure the effect. Further, most related existing studies focus on the contagion effect during the financial crisis period (e.g., Bekaert and Harvey (2003)). However, this thesis contends that "contagion" may also happen in good times. That is, when one country has experienced eye-catching economic growth, which leads international investors to consider other countries with similar economic fundamentals located in the same region (Omae (1985)), for example, Asian economic miracle during early 1990s.

In order to address the above issue, the dummy variable regression model of Heston and Rouwenhorst (1994) has been further extended into a two-stage procedure to extract the regional factor. That is, the market returns have been further decomposed into its world-, region-, industry-, and country-specific components. With these decomposition results, the regional factor will be explored along with industry and country factors in their contribution to the realized emerging market performances of Asia, Latin America, and Europe.[2]

1.3 Research Questions

The specific research questions to be addressed in this study are summarized as follows:

I. What are the major causes of disparate performance across national stock markets?

1. During the sample period of 1994-2003, which factor, industry factor versus country factor, is more important in determining the disparate market performances across countries, in terms of average realized market returns and volatilities?

2. Is the rise of the importance of industry factor in determining the variation in international security returns, as documented in recently published empirical studies, associated with the global business cycles?

II. What are the consequences of the increasing integration at the regional level, either as a result of increased economic ties or as a result of contagion effect, on the performance of emerging markets?

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[2] Overall, what is central to this thesis is to identify the sources of the variation in realized market returns and volatilities. As such, industry, country and regional factors are examined in their respective "raw" forms as estimated from the dummy variable regression model of Heston and Rouwenhorst (1994) without further distinction between expected and unexpected components of each factor. Therefore, the assumption of the estimated factor as the respective proxy for industry-, country- and region-specific risk may be inconsistent with the IAPT, which requires the input of unexpected component of the explanatory variables in the linear multifactor model.

1. Along with industry and country factors, does the regional factor become an important dimension for the portfolio diversification strategy of international investors with interest in emerging markets of Asia, Europe, and Latin America?

2. Once the regional factor is under control via the extended two-stage dummy variable regression model, is country factor still a dominant force in explaining the variation in emerging market returns?

3. Is the regional factor only evident during the financial crises periods?

1.4 Structure of the Thesis

In order to address above research questions, the remainder of this thesis is organized as follows:

Chapter 2 provides an overview of the literature regarding the importance of world, country, regional and industry factors in determining market performances.

Chapter 3 details major research methodologies employed to decompose realized market returns into their respective industry, country and regional factors, along with the major hypotheses to be tested in this thesis. As a summary, the final section outlines major contributions of this study to the existing literature.

The details on FTSE All-World Index Series$^{TM/SM}$, the justifications for such a choice, its summary statistics, and some primary analyses are provided in Chapter 4.

Chapter 5 examines the contribution of industry and country factors to realized market performances. Variance ratio analysis and regression-based analysis have been applied not only to a sample of all 33 markets, but also to two sub-samples consisting of either all 11 emerging markets or all 22 developed markets. Each factor has also been examined within a dynamic framework with time series plots of a rolling window of 36 weeks.

Emerging stock markets have posed a challenge to existing asset pricing models. Chapter 6 has addressed this challenge in the same framework of Chapter 5 with a focus on the regional factor, along with industry and country factors, in determining the performances of a subset of 20 emerging markets of Asia, Europe, and Latin America.

Chapter 7 summarizes the major findings of this thesis. Several implications for international portfolio management are also discussed therein. Suggestions for further studies are provided to conclude the thesis.

CHAPTER II

A REVIEW OF LITERATURE

2.1 Introduction

The centerpiece of asset pricing theory is to "understand the prices or values of claims to uncertain payments," and "*uncertainty*, or *corrections for risk* make asset pricing [theory and its models] interesting and challenging" (Cochrane (2001), p. xiii). Accordingly, the mission of asset pricing models is to identify the sources of risk through the predetermined variables and discover the mechanisms through which these risks interact with each other. Since Markowitz (1952) and Tobin (1958), decades of efforts have been made by both academics and investment practitioners to uncover the factor structure governing the asset returns. As a reward, several asset pricing models, such as the Capital Asset Pricing Model (CAPM) of Sharpe (1963) and Lintner (1965) and the Arbitrage Pricing Theory (APT) of Ross (1976), have been put forward in the existing literature. These theories help uncover the possible factor structure governing the asset returns in market equilibrium.

In the context of international finance, since more than one national stock market is involved, the asset pricing issues become more complicated, as does the factor structure governing international asset returns. Under some regularities as outlined in Solnik (1974) and Solnik (1983), the CAPM and the APT have been extended into the international context, via aggregation of individual portfolio choices and market clearing (Adler and Dumas (1983)). Unfortunately, most of the regularities necessary to derive these international asset pricing models are most often violated in the real world, which lead to a poor performance of these models in empirical studies. The only consensus reached among academics and investment practitioners is that international asset returns are governed by a multifactor model rather than by the world market portfolio alone. Therefore, numerous empirical studies have been dedicated to identifying these additional factors that capture the variation in the asset returns.

This chapter, *A Review of Literature*, attempts to review the theories and models in existing studies that relate realized international asset returns with world, country, regional and industry factors and track the dedicated efforts by theorists as well as empiricists to the development and perfection of these models. Accordingly, the chapter is organized as follows. Section 2.2 outlines reasons why world factors are important in determining the variation in international asset returns, followed by the role of country factors in Section 2.3 and the role of regional factors in Section 2.4. Section 2.5

discusses the capability of industry factors in determining market performance. Section 2.7 summarizes and concludes this chapter.

2.2 International Asset Pricing Models, Globalization and World Factors

The mean-variance CAPM of Sharpe (1963) and Lintner (1965) has been extended into an international context by Solnik (1974b, 1977). Under some regularities regarding world market perfection[3] plus the assumption that interest rates of different countries are considered to be *exogenous* to the system, Solnik (1974) has developed an equilibrium international CAPM (ICAPM):

$$R_{i,j} - R_{j,f} = \frac{\sigma_{ij,m}}{\sigma_m^2}\left(R_m - R_{m,f}\right) \tag{2.1}$$

where, $R_{i,j}$ is the risk premium of asset i in country j; $R_{j,f}$ is the risk free rate in country j; $\sigma_{ij,m}$ is the covariance between the return on asset i in country j and the return on a world market portfolio that comprises all assets in the world and weighted in proportion to their capitalization relative to world wealth (Stulz (1995)); σ_m^2 is the variance of world market return; R_m is the risk premium of the world market, and $R_{m,f}$ is an international bond rate averaged from the risk-free bond rate in each country. The risk-free bond in each country plays two roles: (1) A proxy for the risk free rate; and, (2)

[3] The general set of assumptions are (Solnik (1974), p.502):

1. The capital markets are always in equilibrium.
2. Capital markets are perfect, with no transaction costs, taxes, or capital controls. Investors are price takers.
3. Assets can be sold short.
4. In each country, there exists a market (bond) for borrowing and lending at the same rate (however, this rate does not have to be the same in all countries).
5. Trading in assets and currencies take place continuously in time, which implies a world of flexible exchange rates.
6. Investors hold homogeneous expectations about exchange rate variations and the distribution of returns in terms of the asset currency.
7. There are no constraints on international capital flows.
8. Investors' consumption is limited to their home country. Thus, national investors differ in their consumption baskets and only care about returns measured in their domestic currencies.

As mentioned in Solnik (1974), the last two points are the key assumptions to describe the international market structure. Stulz (1981, 1984) and Adler and Dumas (1983) further add the assumptions that there exists no exchange risk and a constant investment opportunity set; there is a perfect correlation between world market portfolio and world consumption.

a pure exchange asset for foreign investors to hedge against exchange risk (Solnik (1974), p. 515).[4]

Empirically, the single-factor ICAPM fares poorer than the theory predicates, due to its strong assumptions on market clearing conditions and investor behavior. The most powerful challenges include market capitalization and related financial ratios that can predict the cross section of international security returns (e.g., Fama and French (1998)). This evidence suggests that the cross-section returns may stem from the priced world risk factors other than the world market portfolio and a multifactor international asset pricing model may be an appropriate choice.

The Arbitrage Pricing Theory of Ross (1976), later refined and extended by Connor (1984), Huberman (1982), Chamberlain and Rothschild (1983), Grinblatt and Titman (1983), Stambaugh (1986), Ingersoll (1984), and Chen, Roll and Ross (1986) among others, has been extended into the international setting by Ross and Walsh (1983) and Solnik (1983)—the International Arbitrage Pricing Theory (IAPT). The intuition of such a pricing model is that the global common sources of risk may generate expected international security returns, while these risk factors that can be diversified away internationally should not. The IAPT resembles the ICAPM in that both models reckon a linear pricing relationship between expected asset returns and "priced" factors. Whereas the ICAPM is a single-factor model, under "no arbitrage" argument, the IAPT assumes a multifactor structure driving asset returns over time. Further, the IAPT emphasizes the unexpected changes in priced factors, whereas the ICAPM relies on the covariance between excess asset returns and excess world market portfolio returns above an international risk-free rate. Unfortunately, unlike the single-factor ICAPM, the IAPT does not inform the exact number and identity of the priced world risk factors, which leaves an open question for academics and investment practitioners.

Within the framework of the IAPT, a number of studies have empirically documented the relationship between macroeconomic variables and international asset returns (e.g., Ferson and Harvey (1993); Harvey (1991), Solnik (1993); Campbell and

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[4] That is, in the terminology of the funds separation theory, all investors, regardless of their citizenship, will be indifferent between choosing portfolios from the original set of assets or holding the following three funds (Solnik (1974), p.520): (1) a world market portfolio hedged against exchange risk; (2) a portfolio of bonds; and (3) a risk free asset of their own country.

Hamao (1992); Ferson and Harvey (1993); and Bansal, Hsieh and Viswanathan (1993), among others). Besides the world market portfolio, Cho, Eun and Senbet (1986) and Ferson and Harvey (1994) have provided a potential list of global factors that are constructed from a weighted average of local macroeconomic variables, such as GDP-weighted average of the percentage changes in the consumer price indices (CPI) as a proxy for global inflation measure and the global trade-weighted exchange rate as a proxy for global exchange risk. Meanwhile, some others focus on the number of persistent global risk factors. For example, Cho, Eun and Senbet (1986) apply a cross-sectional inter-battery factor analysis on a sample of 349 stocks from 11 developed markets and find that the number of common factors for each pair of markets ranges from one to five, conditioning on the degree of economic integration of two markets.

In summary, asset pricing theories are instrumental in identifying the possible factors and their mechanisms that price international asset returns. Notably, both models implicitly assume that in world market equilibrium, the world capital market is perfectly integrated. Therefore, only world risk factors are important determinants of the variation in international security returns.

The importance of world factors is also corroborated by the ongoing globalization of the world economy and the world capital market. In recent years, the decline in the trading and investment barriers as a result of the emergence of global trade regulatory bodies—for example, General Agreement on Tariffs and Trade (GATT) and its successor World Trade Organization (WTO)—and governments' commitment to economic development in developing countries have fostered increasing economic integration among countries. Further, with the help of the spectacular advancement of information technology, the rapid expansion of multinational companies into both developed and developing countries has sped up such trend. These increased economic ties have led to an increased integration of worldwide capital markets that play a key role in pumping necessary capital into their local economies.

Surprisingly, empirical studies in international finance show that the fast-pacing economic globalization of past decades has not increased the importance of world factors in pricing international security returns as expected. For example, Ferson and Harvey (1994) and Harvey (1995) show that both the ICAPM and the multi-beta models they study fail to explain the cross-sectional variation in expected returns for 18 developed markets as well as emerging markets. This implies that the factors other than world factors may be important in pricing international security returns.

2.3 Country Factors and Market Performance

A tentative explanation of country factors in pricing international security returns is a lack of capital market integration. The integration level of a market with the world capital market is an important dimension in identifying the possible factor structure that drives disparate market performance. The integration argument is based on the premise that the "law of one price" holds universally. According to Bekaert and Harvey (2003): "In finance, markets are considered integrated when asset of identical risk command the same expected return irrespective of their domicile" (p. 4). As implied therein, if a market is not perfectly integrated with the world capital market, risk factors other than world factors may be important in the formulation of the expected returns of securities listed in that market. At the market level, these other factors may be attributed to country-specific factors.[5]

Recent evidence suggests that the world capital market is only partially integrated rather that at the extremes of full integration or full segmentation as assumed in asset pricing theories (Choi and Rajan (1997)). For example, Gultekin, Gultekin and Penati (1989) and Korajczyk and Viallet (1989) show that the performance of the IAPT in a market relies on the specific sample period used in a study, which is strongly related to the openness of that market to foreign investors. This is also confirmed by the work of Bekaert and Harvey (1995), which shows that some emerging markets exhibit time-varying integration with the world capital market. Therefore, in a partially integrated/segmented world capital market, the existence and strength of country-specific factors in explaining the variation in international security returns depends on

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[5] McDonald (1973) relates the integration issue with the portfolio theory and argues that with a fully integrated world market, the only advantage to international diversification is the "pure diversification." That is, the only gains from international portfolio diversification arise from the reduction of the unsystematic component of the total portfolio risk when more securities are added in that portfolio. With market segmentation, however, the potential gains from international diversification across countries can be different from the pure diversification case depending on the risk and return relationships in various markets. Hence, investors may receive benefits that have nothing to do with diversification of unsystematic risk. With various approaches, Drummen and Zimmermann (1992), Beckers, Connor and Curds (1992), Heston and Rouwenhorst (1994), Heston and Rouwenhorst (1995), Beckers, Connor and Curds (1996), Griffin and Karolyi (1998), Rouwenhorst (1999) and Kuo and Satchell (2001), among others, show that country factors are important in explaining the variation in realized international asset returns.

the extent to which a market is segmented from the world capital market. As regards the reasons for market segmentation, existing studies (e.g., Bekaert (1995)) have ascribed them to investment barriers in the form of discriminatory taxes, political risks, information gap, and the inaccessibility of local market by foreign investors, among others.

As far as international asset pricing models (IAPMs) are concerned, market segmentation phenomenon also leads to different risk-return tradeoffs and/or different benchmark market portfolios for measuring the riskiness of securities in different capital markets. Further, with segmented markets, the dominant (or optimal) portfolio (that is, the portfolio with minimum variance for a given expected return) may not include all international securities and, therefore, international portfolio investment should be made only on a selective basis (Stulz (1981)). As an example, Stulz (1995) provides an analysis of the errors generated by using domestic CAPM where ICAPM is appropriate to price international securities. The world market beta of a given security *i* would be:

$$\beta_i^w = \beta_i^d \beta_d^w + \frac{\operatorname{cov}(e_i^d, r_w)}{\operatorname{var}(r_w)} \quad , \tag{2.2}$$

where, *cov* and *var* are covariance and variance operators, β_i^w is the actual world market beta of a given asset *i*, β_i^d is the local market beta for asset *i*, β_d^w is the local market beta, e_i^d is the residual from using domestic CAPM to price asset *i* that should be priced by the ICAPM instead, and r_w is the return on the world market portfolio.

Bekaert and Harvey (1995) argue that the evolution of a market from being segmented to being integrated with the world capital market is implemented on two levels: economic integration[6] and financial integration.[7] The economic integration does not necessarily incur financial integration, whereas the financial integration implies the former. This may be the reason why economic globalization does not necessarily increase the proportion of the variation in international asset returns to be explained by

[6] Economic integration refers to "decreased barriers to trading in goods and services" (Bekaert and Harvey (2002), p. 431).

[7] Financial integration refers to "free access of foreigners to local capital markets (and local investors to foreign capital markets)" (Bekaert and Harvey (2002), p. 431).

world factors. The empirical studies on emerging market finance in the early 1990s (e.g., Bekaert and Harvey (1995)) conclude that the degree of market integration is changing over time and most emerging markets are partially integrated to the world capital market. As a result, several methods have been proposed to measure integration level and resulting indicators have explicitly incorporated in some empirical asset pricing models to control the dynamic integration process (e.g., Bekaert and Harvey (1995), Bekaert, Harvey and Lumsdaine (2002), and Henry (2000), among others). Recent studies, however, have shown that the level of integration of emerging markets with the world capital market has increased significantly during late-1990s, indicating the possible increase in the importance of world factors (Bekaert and Harvey (2003); Kim and Singal (2000)).

The second tentative explanation of country factors in pricing international asset returns is attributed to the well-documented "home-bias" phenomenon (French and Poterba (1991); Cooper and Kaplanis (1994); Kang and Stulz (1997); Lewis (1999), among others). Instead of holding a global optimal portfolio across different markets, typical home biased investors have over-weighted domestic securities in their portfolio. The home bias is pervasive across countries. For example, French and Poterba (1991) show that at the beginning of the 1990s, most investors in major developed markets overvalued their portfolios to domestic securities above 90 percent. This is also confirmed by a follow-up study by Tesar and Werner (1995) on investors in OECD countries. Different reasons are outlined to explain the home-bias phenomenon, such as information asymmetry and its related high cost relative to the gains from international portfolio diversification (see Lewis (1999) for an extensive review). Recent empirical studies find that even if the investment barriers across borders have diminished dramatically during recent years, investors still exhibit strong biases towards domestic securities. As a result, given the portfolios are intentionally overweighed in domestic securities, country factors may find their way in determining the variation in portfolio returns held by home-biased investors.

The third tentative explanation of country factors in pricing international asset returns is attributed to the deviations from purchasing power parity (PPP). As mentioned, unlike the domestic market in which only one economy is concerned, within the context of international finance, different markets with different characteristics have to be considered in parallel. The PPP theory states that the exchange rate between two countries should equal the ratio of the two countries' price level of a fixed basket of goods and services. When a country's domestic price level is increasing (inflation), that country's exchange rate must depreciate accordingly in order to return to the PPP. However, empirical evidence, such as that by Froot and Rogoff (1995), shows that this assumption is often violated. Adler and Dumas (1983) relate the violations of PPP to the international asset pricing issues. They argue persuasively that since investors in different countries consume different bundles of goods, with inflation risk and deviations from the PPP, investors in different countries are induced to hold portfolios that differ by a component used to hedge against inflation risk. Hence, the violation of PPP will introduce different portfolio construction strategies for international investors residing in different countries as well as from the domestic investors. Facing the frequent deviations from the PPP, several researchers have explicitly incorporated currency risk into IAPMs. For example, Sercu (1980) and Stulz (1981) have derived a multifactor version of ICAPM, in which currency risk has been considered together with world market portfolio (see Stulz (1995) for an overview of the existing literature).

From the above analysis, two important sources of risks can be identified. One is the currency risk due to the unexpected changes in the exchange rates of respective currencies. These unexpected changes can incur/reduce risks to investors because at the end of the holding period, realized asset returns will be converted from foreign currencies to their domestic equivalents. The importance of this risk depends on the composition of the portfolios, the volatility of the exchange rates, and the correlation between the exchange rates and the returns on foreign assets. Odier and Solnik (1993) have shown that if total risk of foreign securities is decomposed into the components of currency risk and volatility in local currency value, currency risk contributes a considerable proportion to the total volatility of securities. Despite that, in the same work, Odier and Solnik have also shown that currency risk can be compensated by international diversification benefits. The second one is the inflation risk; that is, the unexpected changes in the inflation rates at home, via which investors discount nominal returns into their real equivalents.

Additional studies have sought to identify the other country-specific risk factors governing the international security returns; most of these factors are borrowed from the existing studies on domestic asset pricing models. For example, most empirical studies are based on the work of Chen, Roll and Ross (1986), who have tried to identity the possible priced country factors from the pre-determined macroeconomic variables that influence the expected cash flows and expected discount rate in a dividend discount model. As a result, a couple of macroeconomic variables have been proposed and transformed in their study (see p. 387 for a detailed list of these macroeconomic variables). They find that in the U.S., along with the proxy for the U.S. market portfolio, industrial production, changes in risk premium, term structures, and two measures of inflation are significant in explaining the variation in the realized security returns in their study. On the other hand, Fama and French (1996) have related the expected security returns to the excess market portfolio return, along with firm specific characteristics, i.e., a portfolio long in high book-to-market stocks and short in low book-to-market stocks (HML) and a portfolio that is long in small firms, in terms of market capitalization, and short in large firms (SMB). Mounting empirical studies in international finance indicate that the book-to-market effect is common to both developed and emerging markets (Chan, Hamao and Lakonishok (1991); Fama and French (1998)). As regards the priced factors in emerging markets, Rouwenhorst (1999) concludes: "The factors that drive cross-sectional differences in expected stock returns in emerging equity markets are qualitatively similar to these that have been documented for developed markets."

2.4 Regionalism and Regional Factors

Coupled with the economic coordination at the global level, there also appears to be a strengthened economic tie among countries on a regional basis via the emergence of large regional trading blocs, such as the European Union (EU), the North American Free Trade Agreement (NAFTA), and the Association of Southeast Asian Nations (ASEAN). Through the greater coordination of macroeconomic polices, many member countries have liberalized their financial markets by removing the investment barriers to capital flows to other member countries, which leads to a higher degree of the integration of capital markets at the regional level. As a result, regional factor, representative of forces that link capital markets with geographical proximity, may also play an important role in explaining the variation in international asset returns.

As suggested by Paisley (1990), the regional integration of capital markets may also be due to the co-operative agreements between regional exchanges. This is much more pronounced in Europe, in which several European stocks, such as Shell, are traded simultaneously on different European stock exchanges. Further, recent financial crises in emerging markets, such as the 1997 Asian Financial Crisis, suggest that they are transmitted initially on a regional basis before proliferating to global capital markets. This is corroborated by the mounting studies on contagion effect in emerging markets (Bekaert and Harvey (2003); Claessens, Dornbusch and Park (2001), among others).

Despite the emergence of regionalism as an important dimension for international investment, regional integration has been little discussed. Using weekly total returns on companies domiciled in eight developed markets from July 1989 to January 1999, Diermeier and Solnik (2001) find that regional factors, along with currency factors, have a strong influence on asset returns beyond that of domestic factors. Heaney and Hooper (2001), via cluster analysis, find markets are generally segmented on a regional basis. With a focus on 20 emerging markets during January 1985 through December 1997, Bilson, Brailsford and Hooper (2001) have employed a principal component analysis approach and find considerable commonality at the regional level rather than at market level.

2.5 Industry Factors and Market Performance

Recently, numerous studies, such as those by Roll (1992), Grinold, Rudd and Stefek (1989), Heston and Rouwenhorst (1994), Griffin and Karolyi (1998), Beckers, Connor and Curds (1996), Cavaglia, Brightman and Aked (2000) among others, have contended that global/local industry factors may be important in explaining the variation in international asset returns. Their arguments are based on the observation that firms within the same industry usually move together and industrial structures are different across stock markets.

Early studies, e.g., the works by Tysseland (1971), Murphy and Stevenson (1967), and Brigham and Pappas (1969), however, discredit the industry analysis as an important part of security valuation process in that the securities within the same sectors lack the homogeneity in their lines of business. The inconsistency in the performance of industry indices over time has also cast doubt on the validity of industry analysis. However, given the increasing globalization of the world economy and increased correlations among major capital markets during recent years, industry analysis has regained its glamour.

2.5.1 Justifications for the Industry Analysis

The importance of industry analysis has both its theoretical and pragmatic connotations for portfolio analysis. Firstly, industry analysis is an important component of investment strategy for practitioners. In a typical top-down approach to the global investment, global portfolios may usually be formulated firstly on the basis of country and industry dimensions, then, at a company level. Further, the important contribution of industry factor to the variation in asset returns can also be accredited for the following reasons.

1. The nature of industry. First of all, the economy-wide business cycle also has significant impact on the performance of industries. It is quite observable that certain industries fare well in expanding economies while others have impressive shows during recessions. So, an analysis based on industry groups may better capture the driving forces behind the stock market as the whole.

Like the economy, industries also have their own life cycles: the industry life cycle. This cycle can be roughly divided into four stages: Development, expansion, maturity and decline (Brailsford and Heaney (1998), p. 355). The identification of which stage a given industry is at is important in that it helps the understanding of the factors that affect the security performance. The Information Technology (IT) industry is a case in point. During the mid-1990s when the IT industry experienced a rapid growth period, the market spotted huge abnormal returns as a result of malformed expectations of future profitability from investors. However, with bursts of bubbles one after another in the late 1990s, investors became more rational regarding the profitability outlook of the IT industry. Consequently, the performance of the IT industry experienced a slump with the slow recovery. Brooks and Catao (2000) has provided the evidence that the increasing importance of global effects since the mid-1990s in explaining the variation in international security returns is largely due to the amazing growth in the IT industry.

Moreover, some industries are capital-intensive, e.g., the automobile industry, some are knowledge-intensive, e.g. the IT industry, while others are labor-intensive, e.g. the textile industry; some are more globally oriented, such as finance, and some are more domestically focused, such as utilities. An early study by Reilly and Drzycimski (1974) demonstrates that substantial divergence exists in relative performance among industries during any given sample period; and, considerable variability also exists in the relative performance of industries over time. They also find substantial variation in risk across industries (as measured by the betas of industry returns relative to the S&P 500 Index); however, the risks are reasonably stable over time. A later study by Weiss (1998) shows that certain industries, such as the oil and autos industries, are global and thereby fairly homogeneous in their performances; meanwhile, other industries, such as the health care and retailing industries, are localized and thereby heterogeneous in their performances. Therefore, the difference in the industrial performances indicates that it is worthwhile devising a portfolio with an industrial outlook and thereby the potential gains can be exploited by identifying these industries likely to experience superior performance.

2. The breadth and weighting scheme of market-wide indices. At the market level, closely-followed stock market indices are supposed to summarize the cross-sectional performance of the listed stocks. Through these indices, investors are able to see, at a glimpse, what is going on within the market in general or within some subsets of stocks. These market-wide indices are different in the number and types of the seed stocks covered, conditioning on which feature of the market these indices want to capture. In theory, the broader an index is, the closer the index is representative of the performance of the whole market or a specific aspect of the market movement. In practice, however, it is not efficient to include all listed stocks in a market to construct these market indices. If so, such a market-wide index will produce a spurious proxy for the market because of the well-documented abnormal performances of and thin trading of small stocks (measured as market capitalization). As an industry standard, seed stocks that qualify for the inclusion in a market-wide index are usually required to meet a number of criteria. Normally, these criteria include, for example, size, liquidity,[8] a minimum period of listing,[9] and possibly, a representative of the industrial composition of the whole market. Index construction manuals like FTSE (2003) suggest that, for a given market, large capitalization firms are usually selected into the market index as a proxy for the market-wide movement. Given various natures of industries, it is quite

[8] Liquidity criterion is used to ensure that subject stocks are actively traded.

[9] This measure is used to ensure that subject stocks are well established in the market.

likely that the market index, especially the capitalization-weighted one, will be biased towards capital-intensive industries, such as the automobiles industry. As a result, industry- or even firm-specific innovations may find their ways into the variation in market index.

Further, in the organized stock exchanges, besides the market wide indices, such as FTSE 100 for the U.K. stock market, it is also quite common to see stocks are grouped according to their industry classification. Such a classification is intuitively appealing in that companies in the same industry tend to be subject to the common source of risks specific to profitability of their major lines of businesses. The existence of these indices also reflects the truth that investors think of stocks as falling into groups according to the similarity of their performance. Unfortunately, compared with market-wide indices, not all industry indices have sufficient number of representative stocks to guarantee their being well-diversified portfolios without the impact from the firm-specific risks of the dominant firms in that industry. As a result, with these thinly-covered industry indices, it would be difficult to discern the industry-/market- shocks from the firm-specific shocks. This imperfection can pose a serious problem to a study that uses industry indices to examine the industry factor in a given market without the further knowledge about their exact compositions of stocks.

The weighting scheme used to weight each stock in an aggregate index, like the national market index, can also be important in measuring the impact of the industry factor on market performance. If a capitalization-weighting scheme is used, industry shocks will be reflected in the market index proportional to industry weights. Hence, a significant change in index returns on an industry with a large market capitalization will have more profound impact on the market index than an industry with a smaller market capitalization. Such an impact will reflect in the conventional risk measures, such as variances or standard deviations, which are computed on the time series observations of the market index. If an equal-weighting scheme is used, market indices will be sensitive to all industry shocks regardless of their market capitalizations. As a result, such market indices will be more volatile than their capitalization-weighted counterparts.

3. The principle of comparative advantage. The idea of comparative advantage[10] is simple and intuitive. In a simplified two-country model, if one country can produce some set of goods at a lower cost than a foreign country, and if the foreign country can produce some other set of goods at a lower cost than the former country does, then clearly it would be better-off for both countries to trade these goods that can be cheaply produced within each country. One of the implications from this principle is that countries should specialize in products they can produce cheaply *relative* to other countries in world economy.

The theory of comparative advantage argument has led the support to the fact that not all industries are expected to be well represented in stock markets. The worldwide distribution of the industries is subject to the constraints like the availability of natural and human resources. For example, a full-fledged IT industry will not be expected in a country with a very poor education establishment. And a flourishing oil industry is also not expected in a country with a shabby economy or no endowment of oil at all. Thus, it is not surprising to see industrial mixes are different among countries. Accordingly, the stock markets therein may reflect the industry concentration phenomenon through its listed stocks that provide an important contribution to the economy of their domicile countries. Further, the industrial concentration phenomenon is more pronounced in small economies than the big economies. In a highly competitive world economy, these small economies strive to take a full advantage of their comparative advantage to sustain their economic growths. Thereby, the industries with comparative advantage in these economies will acquire the scarce capital from either the government or the capital market to increase their production capacities, which in turn fulfill the roles as pillar industries to contribute to their respective economies. Hence, it is expected to see that only a couple of industries with comparative advantage or firms therein dominate the stock markets of small economies in terms of market capitalization. For example, the resources and mining industry is expected dominant in the market indices of Australia, given the bountiful endowment of natural resource like natural gas and minerals.

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[10] As its name suggests, the principle of comparative advantage does not necessarily mean that a country should have an absolute advantage over other countries in producing goods which it specializes in. Countries are *relatively* better off through international trade, at world price, if they can specialize in products which they are *relatively* good at with cheaper costs. Of course, it also has its disadvantages. Among others, it measures comparative advantage in terms of labour, and ignores non-trivial issues like factor mobility among countries and transportation costs. In sum, it fares well in explaining the international trade phenomenon as a theory.

4. Increased business activities of multinational companies (MNCs). As globalization evolves, multinational companies become more important in the world economy. The same brand name, such as Coco-Cola, is often listed in different stock exchanges. For a given MNC, it may have many diversified lines of businesses that can possibly neutralize the shocks from a specific industry, meanwhile, amplify the country risk from the country where the headquarter is located. However, their business activities may also intensify the industry specific risk through their network of manufacturing bases, supplier chains and so on, located in different countries, which, in turn, have a significant impact on the local market performance. Furthermore, the increasing globalization of MNCs' revenues and operations and the increasing intra-industry mergers and acquisitions across countries also strengthen the role of the industry factor in determining the performances of the markets where MNCs are listed.

5. Integration at the industry level versus integration at the market level. The degree to which national stock markets are integrated with the world capital market plays an important role in deciding the relative importance of industry and country factors in explaining the variation in realized market returns and volatilities. The past decades have witnessed the increased correlation between national stock markets. A number of researchers have shown that the economies of the developed countries have become more integrated. De Santis and Gerard (1997) illustrate that the G7 countries are effectively integrated with the world market. Dumas, Harvey and Ruiz (2003) find that the increased correlations among OECD stock markets are consistent with integration hypothesis. For emerging markets, recent evidence (e.g. Bekaert and Harvey (2002)) shows that emerging markets have experienced increased correlations with the world market as well as among themselves during the last decade. However, even if a market is economically and financially integrated with the world capital market, some of its industries may not be well integrated with the same industries in other markets due to foreign ownership restrictions or the low level of trading activities with foreign countries. Further, a country that is segmented from the world market may find some of its industries are closely integrated with the rest of the world through international trading and overseas listings. Therefore, through the integration at the industry level, industry factor may be important for those industries that produce tradable products (e.g., Griffin and Karolyi (1998)).

Overall, national stock markets with different industrial structures, either as a result of the technical aspect of index construction, or as a result of natural endowment, or as a result of some other un-documented reasons, are exposed to different risks rather than country or world market specific risks alone. As outlined in this section, industry factor may be important in determining the market performance due to the increasing economic integration, the industry reorganization, and the blur of national boundaries through the formulation of regional or global trading blocs; it has become an important dimension for the international portfolio analysis.

2.5.2 Empirical Studies on Industry Factors

A common approach employed in early studies to examine the relative importance ofthe industry factor is to analyze the correlation or variance-covariance matrix of security returns (e.g. Grubel (1968), Levy and Sarnat (1970), and Solnik (1974), among others). Within the international context, if national stock market indices are less correlated with each other than are global industry indices, then country factors are deemed more important, and *vice versa.* Then a portfolio that diversifies across countries may generate more sizable economic benefits than a portfolio across industries. Analysis of this type can be misleading, however. The national stock market indices normally contain industry and global factors as well as country-specific factors. Empirically, it is quite difficult to discern which component produces the low/high correlations. Notice that implicit in this analysis, the world market is assumed to be integrated and the factors (sources of risks) will be priced in the same style in each market.

In order to perform a more precise study on the relative importance of industry and country effects in each market, proper proxies should be composed without contamination from other factors. To this end, early studies, such as that of King (1966), tend to exploit the variance-covariance matrix via factor analysis and/or principal component analysis, in which the orthogonal factor loadings are assumed representative of each factor.

Employing monthly returns of 63 stocks[11] listed on New York Stock Exchange (NYSE) that were continuously listed from May 1927 through December 1960, via a refined two-stage principal component analysis,[12] King (1996) finds that the factor loadings from the two methods are the same and about half the variances of the security returns are explained by this main component, the proxy for market effect. However, a considerable variation exists across industries regarding the explanatory power of the market effect as well as over time. In contrast to market effect, on average, only about 20 percent of the variance can be attributed to the hypothetical industry effects, based upon the R^2 measures provided by the centroid method.

Next, King removes from the covariance matrix the portion of variance explained by the market factor before using three factor analysis methods[13] to further analyze the residual covariance matrix. He finds that industry effects explain about 10 percent of the variance in security returns. These empirical results are also robust to the four 100-month sub-periods. Equipped with the above empirical results, he concludes that "in addition to expressing his subjective assessment of the comovement of yields and the market, the investor will have to think about the relation of subgroup index numbers to security performance" (p. 166).

Meyers (1973) criticizes that the importance of industry factor in King's (1966) study is sample specific and empirical method specific. With the aim of testing the robustness of King's results to a sample selection bias, Meyers has used two samples of sixty stocks. The first sample is exactly identical to that of King (1966) but with update data. The second includes a sample of five stocks from each of twelve industries, whose "operations are much more similar than these in the original sample [as these in King

[11] These 63 stocks were selected from a universe of 316 listed common stocks on New York Stock Exchange (NYSE). King further divides 63 stocks into broader six two-digit industries (the details are provided in p. 150 of King (1966)) according to a system of classification based on differences in product and technology, i.e., Tobacco, Petroleum, Metals (ferrous and non-ferrous), Railroads, Utilities, and Retail Stores.

[12] In the first stage, King has estimated the portion of covariance among the variables which can be explained by factors common to more than a single variable, i.e., communalities, and separated that portion of variance from the portion unique to the various individual variables. Then, he uses the centroid method and Guttman-Harris method of principal components analysis to estimate the contribution of the market factor to the variations of sample stocks from the communality covariance matrix.

[13] These three methods are cluster analysis, a "quick and dirty" technique commended by the intuitive appeal of the results; multiple factor analysis, which is designed to maximize the portion of variance explained by predefined six industry factors; and additional Guttman-Harris analysis.

(1966)] and whose compositions were much less homogenous." A similar component analysis as King's (1966) is used to obtain the proxy for the market factor, and the empirical results are almost identical to the original work; however, the percentage of variance explained by the market factor has declined during his sample period, from 55 percent prior to 1944 to less than 35 percent from 1952 through 1967. A further analysis reveals that the variance explained by the industry factor is considerably smaller than the case in King's (1966) study, with the total variance explained by twelve industries being only about 18 percent and 45 percent for residuals (p. 702). Hence, bringing together these empirical results, Meyers (1973) concludes that King's study has "over-stated the role of the industry factor in the market as a whole." However, from the cluster analysis and principal component analysis on residual variances, he also recognizes that the industry factor can be an important source of the interdependence of individual securities, though the magnitude is not that large as in King's study.

One of unpleasant features of analyses based on the variance-covariance matrix of security returns is that the correlations and variances are assumed to be stable during the sample period. Such an assumption implies that the return generating process is stationary throughout time. Given the non-stationary nature of financial data, the inferences drawn from the above assumption may impose (Longin and Solnik (1995); Longin and Solnik (2001)) unnecessary and unrealistic restriction on the factor structures. The work of Meyers (1973) indicates that the empirical results from factor analysis are sensitive to the sample size, the sample period studied (confirms the unstable correlation/covariance matrix over time), and the definition of industries. Further, as contended by Reilly and Drzycimski (1974), the impressive clustering analysis results in King's (1966) study may be ascribed to the unique method adopted by King to adjust for the market effect in his second stage factor. If a common adjustment for the common market factor is applied to each stock, the clustering results could be totally different. This proposition is confirmed by an unpublished study by Gaumnitz (1971) with market-adjusted data. He finds that after applying the centroid analysis to King's (1966) data, the clustering results have little resemblance to classified industry groups. Hence, the unique adjustment for the market effect in King's (1966) study may be a contributor to the finding of the importance of industry factor, proxied by principal components, in determining realized security returns.

Instead of focusing on the correlation/covariance matrix of security returns with a quite stringent set of assumptions, later studies have focused on a multifactor return generating process with the explicit incorporation of the industry factor.

The work of Lessard (1974) is one of the earliest studies and extends the study on industry factors into an international context. His study is based on a sample of monthly, capitalization-weighted, U.S. dollar denominated returns of sixteen major stock markets and thirty global industry indices from Capital International, S.A. during the period from January, 1959 trough October, 1973. He argues that these indices can be regarded as global portfolios with maximum risk exposure to industry or country factors. Lessard has explicitly specified an augmented market model for security returns. That is, he has regressed individual security returns on three proxies for the world market index, as well as on either a country or an industry index. In order to minimize the possible multicollinearity among factors, Lessard has orthogonalized the country and industry indexes by regressing various indexes on the world market index and using the residuals as the vehicle for "orthogonalized" industry and country factors. He concludes that the explanatory power of the country factor dominated industry factors.

Unfortunately, in his study, Lessard (1974) has used market and industry index returns that are confounded with other factors. Even if he has orthogonalized factors by regressing market and industry indices against world market index, the obtained residuals cannot be qualified as the proxy for the factors specific to the industry under consideration because they either contain the undiversified country factor when an industry is globally concentrated in one country, or the undiversified industry factor when the country concentration exists in one particular industry. Further, his conclusion relies on two separate regressions for industry and country factors; the marginal explanatory power of one factor conditional on the other is not considered in his study. In order to address this problem, other follow-up studies have adopted a cross-sectional factor model to take account of both industry and country factors in the same regression.

Roll (1992) rejuvenated the industrial versus geographical diversification issue in early 1990s. In the spirit of the cross-sectional regression model of Fama and

MacBeth (1973),[14] Roll has suggested the following model specification to decompose a cross-sectional market return ($R_{j,t}$) into its industry factors (see Roll (1992), p. 11, Equation 2):

$$R_{j,t} = \sum_{i=1}^{N} \omega_{i,j,t} I_{j,t} + e_{j,t} \quad , \tag{2.3}$$

subject to:

$$\sum_{i=1}^{N} \omega_{i,j,t} = 1 \quad ,$$

where, N is the total number of industries, in his study $N = 7$; $\omega_{i,j,t}$ is the weight for industry i located in country j computed from market capitalization for that industry at the beginning of the period t; $I_{j,t}$ is the dummy variable for industry j if during the period t, industry i is present in country j; and, $e_{j,t}$ is the error term with an expedient explanation as a component specific to that country.

In order to examine the role of the industry factor in explaining the variation in the realized market returns, Roll has applied a linear regression to each sample market with the explicit incorporation of the industry factors estimated from Equation 2.3 and a proxy for currency risk. With daily market returns of a sample of 24 countries during the period from April, 1988 to March, 1991 and seven industries, he finds that on average, the global industry factors that are estimated exclusively from foreign countries and currency risks can explain about 50 percent, measured as adjusted R^2, of the variation in the U.S. dollar-denominated market returns; industry factors are more important than currency risks for most of his sample markets, with the former explaining about 40 percent of the volatility and the latter explaining about 23 percent, when they are examined alone.

In a recent study, using monthly returns on 20 capitalization-weighted industry portfolios from July 1963 through July 1995, Moskowitz and Grinblatt (1999) have

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[14] Compared with the approach proposed by Fama and MacBeth (1973), Roll's model assumes that, during each period, each industry has a beta equal to its corresponding weight in each market. Then, a cross-sectional regression is run for each period to obtain a time series of "risk premium" for each industry, as long as there are no two countries have the same proportion of industry mix.

shown that industry components of security returns are the major contributor to the individual stock momentum anomaly in the U.S. market. Industry momentum strategies are highly profitable after controlling for well-known effects, such as size, book-to-market equity ratio, and individual securities momentum effects.

2.6 A Synthesis

Given the importance of world, country, and industry factors in explaining the variation in the realized international security returns, several studies have attempted to incorporate all three factors together within one framework.

Drummen and Zimmermann (1992) have adopted a variance decomposition analysis on a sample of daily, local currency denominated returns on 105 stocks from 11 European countries over the period of 1986-1989. Notably, most these companies are multinational companies. Their approach assumes that security returns can be described by an index-factor model and the factors within the model can capture the entire systematic risk. The relationship can be expressed in terms of a simple linear regression model:

$$R_{i,t} = \alpha + \sum_{k=1}^{K} \beta_i \, R_{k,t} + e_{i,t} \quad , \tag{2.4}$$

where, β_k is the coefficient of factor k; K is the total number of systematic factors to be considered, i.e., world, European, industry and country factors; $R_{i,t}$ is the return on security i at time t; $R_{k,t}$ is the risk premium for factor k at time t; and $e_{i,t}$ is the variance specific to security i.

In order to minimize the possible multicollinearity problem among explanatory variables, Drummen and Zimmermann have used the orthogonalized factors in the left hand side of Equation 2.4. That is, a factor is regressed against one or several other factors that are supposed to be correlated with the dependent variable; the residuals from the regression are treated as orthogonalized factor for the dependent variable. Then, the orthogonalized factors are used in Equation 2.4 instead of their raw forms. R^2s are used as a measure of the fitness of the model when different factors are *successively* added to the Equation 2.4 and act as a proxy for the proportion of the security returns can be explained by factors. Accordingly, the proportion of a security's variance that can be diversified away is represented by $1 - R^2$. Alternatively, the variance of security returns can also be additively decomposed into factor variances and a security-specific variance:

$$\operatorname{Var}\left(R_{i,t}\right)=\sum_{k=1}^{K}\beta_k^2 \operatorname{Var}\left(R_{k,t}\right)+\operatorname{Var}\left(e_{i,t}\right) \quad , \tag{2.5}$$

where, Var(·) denotes the variance of the variable within the parentheses. The factors used are orthogonalized factors as in Equation 2.4.

Armed with the above model specification, Drummen and Zimmermann (1992) find that country-specific factors contribute, on average, about 19 percent, to the variation in European security returns. For the two largest European markets, Germany and the U.K., however, industry factor is more important than their respective country factors. They also report that the country factor in industry indices is larger than the industry factor therein. Further, Drummen and Zimmermann have also specified several international multifactor models with different permutations of currency, country and industry factors. Using R^2s as the indicator for the explanatory power of each factor, they conclude that the country factor dominates the industry factor on the ground that: (1) The marginal explanatory power of the industry factor, proxied by industry indices, is less than that of country factor, proxied by market indices; (2) a model with only country factor has an explanatory power, on average, almost the same as a model with five factors, i.e. currency, world, European, industry, and country factors; and, (3) other factors are less important in his sample of European stocks. Further, these empirical results are robust to the numeraire currencies used to convert local returns, i.e., the U.S. dollar and the European Currency Unit (ECU).

Grinold, Rudd and Stefek (1989) have proposed a model beginning with the assumption that the risk of a given international portfolio consists of several identifiable components. That is, the portfolio returns are first decomposed into a currency return component, which includes both the change in the foreign exchange rate and the local interest received on a currency investment, and an excess return in the local markets above the local interest rate. As demonstrated in their study, the cross-product term between currency returns and local market returns over a short period in low risk countries is so small that this term can be dropped from the consideration. Hence, the common currency denominated returns on a portfolio can be approximately expressed as a linear function of the excess returns in the local versus numeraire currency plus the local excess market returns.

Then, the cross-section local excess portfolio return is further partitioned into returns attributable to the local systematic risk, the industry mix, and firm specific attributes, such as volatility, size, dividend yield and success, that have been normalized for all securities in that market:

$$r_{it} = \sum_k b_{ik} h_k + \sum_j y_{ij} g_j + \sum_n x_{in} f_i + u_i \quad , \tag{2.6}$$

where, b_{ik}, y_{ij}, and x_{in} are pre-determined variables describing the relevant components of an asset return, namely, the market beta, industry assignment, and common firm attributes. Variables h_k, g_j and f_i represent the corresponding risk premia attributable to country, industry, and firm-specific factors. Specifically, b_{ik} for industry i in country k is estimated in the previous period for security i, and zero otherwise. Therefore, this variable behaves like a dummy variable but its value is the predicted beta instead of *ones*. y_{ij} is the set of dummy variables for the industry assignment: If security i is from industry j, it equals one and zeros for others. The last term f_i is the normalized firm specific attributes, i.e., volatility, success, size, and dividend yield, which are comparable across countries. u_i represents a firm specific risk term for return on security i that cannot be explained by the above factors. In order to solve the perfect linearity between industry dummies, they choose the automobile industry as the benchmark to estimate the model cross-sectionally. Their results, as estimated from Equation 2.6, have largely confirmed Lessard's (1973) results that in general the country factor dominates industry factor in determining the variation in realized security returns. However, Grinold, Rudd and Stefek find that each factor plays less homogenous roles in different countries or industries than the study of Lessard (1973). Hence, they conclude: "Most countries are more important than industries, but most important industries are more important than the less important countries."

Heston and Rouwenhorst (1994) follow the spirit of Grinold, Rudd and Stefek (1989) but rely on a much simpler logic and intuitively appealing specification of the factor structure governing international security returns. First, they postulate that a cross-section security return can be linearly decomposed into a world market factor, an industry factor, and a country factor, plus a security-specific risk. That is, for *i*th security that belongs to industry *j* and country *k* at time *t*, its return can be decomposed as:

$$R_{i,t} = \alpha_t + \beta_{j,t} + \gamma_{k,t} + e_{i,t} \, , \tag{2.7}$$

where, α_t accounts for a world market factor that captures the broad comovement across security returns. As argued by Brooks and Catao (2000), α_t can also be used to control the impact from global business cycles. $\beta_{j,t}$ is the industry-specific effect, which reflects the differences in technology and product across industries; $\gamma_{k,t}$, the country-specific effect used to control for determinants of security returns specific to country *k*; and, $e_{i,t}$ is a security-specific effect with a zero mean and finite variance that are uncorrelated across securities.

Then, two sets of dummy variables are used to identify the industry and country affiliation of each security:

$$R_{j,t} = \alpha_t + \sum_{j=1}^{J} \beta_{j,t} I_{j,t} + \sum_{k=1}^{K} \gamma_{k,t} C_{k,t} + e_{j,t} \, , \tag{2.8}$$

where, $I_{j,t}$ and $C_{k,t}$ are the dummy set for industry and country, respectively. The estimated coefficients for industry and country factors are regarded as their respective risk premia relative to the intercept—the average or value-weighted world benchmark performance, conditional on whether the ordinary or weighted (by each security's market capitalization) linear squares regressions being used. In a follow-up study, Heston and Rouwenhorst (1995) interpret β's and γ's as portfolio tracking errors relative to the world benchmark—α. That is, the estimated coefficients for industry and country effects indicate that how much better or worse a portfolio would have performed if the portfolio tilts towards an individual industry or a country. For the perspective of the study of Fama and MacBeth (1973), the time series betas for industry and country factors in Equation 2.8 are assumed to be either zeros and fixed over time.

Notably, Equations 2.7 and 2.8 can be regarded as an abstract of the international multifactor asset pricing models examined in existing literature that have incorporated the pre-determined macroeconomic and/or market-wide variables. For instance, the error term in Equation 2.7 and 2.8 can be interpreted as a proxy for the interactive result of size and value premia; or, the country factor can be regarded as a combined representative of macroeconomic variables that are specific to a market.

Equipped with the above model specification, Heston and Rouwenhorst (1994) have studied a sample of 12 European countries (in total 829 stocks, Deutsch mark-denominated returns) that are supposed to be more economically and financially integrated than other regions, yet, with different industrial compositions during the period of 1978-1992. They use the same broad industry categories as in the study by Roll (1992) and find that during the sample period, the country factor dominates the industry factor by comparing the average absolute values and standard deviations of each factor, as well as the ratios between the variance of estimated industry (country) factor within a market and the variance of that market's excess return above the world benchmark. As a result, they conclude that as far as their sample of European markets are concerned, a portfolio that diversifies across countries can decrease the variance of the portfolio more than (1) a portfolio that either diversifies within an industry but well-diversified across countries, or (2) a portfolio that diversifies within a country alone but across different industries therein.

Their empirical findings of the dominance of the country factor over the industry factor in explaining the variation in European security returns are counterintuitive. The European markets studied in the study by Heston and Rouwenhorst (1994) are, as mentioned before, economically and financially integrated with each other through the formulation of the European Union. As a result, the common factors, such as regional or world market factors, should rise in their importance in pricing assets when national borders become blurred across markets. In follow-up studies focusing on European countries over an extensive time period (e.g., post Maastricht Treaty), Heston and Rouwenhorst (1995) and Rouwenhorst (1999) again find that the relative strength of the country factor is unaffected by the sample periods and the increased economic integration among European countries. For example, by examining average absolute values, Rouwenhorst (1999) finds that the average country factor is twice as large as the average industry factor. Similar results are also obtained when each factor is measured in their standard deviations; the standard deviations of all the estimated industry factors, except for the energy industry, are much smaller than these of country factors. Consequently, Heston and Rouwenhorst further postulate that the country factor is likely to be more important for stock markets that are further geographically apart or in emerging markets.

Beckers, Connor and Curds (1996) and Griffin and Karolyi (1998) have extended Heston and Rouwenhorst's (1994) model to examine the sensitivity of industry and country factors to the different granularity of the industry classification and industries producing goods with a different nature.

Griffin and Karolyi (1998) have used the same model as Heston and Rouwenhorst (1994) but on returns on industry indices instead of individual securities. They have proved that the estimated coefficients for industry and country factors are identical to those estimated from individual securities, as long as the weighted linear squares regression is used. With that proof, they have compared the performance of each factor estimated from industry indices in 25 countries as supplied in the Dow Jones World Stock Index during the period of January 1992 through April 1995. Under a broader industry classification of nine industries, their variance ratio analysis on industry and country factors indicates that during the sample period, on average, less than 4 percent of the variation in excess country indices can be explained by their respective industry factors. This result is confirmed by factors estimated from a more refined industry classification of 66 industries but with a slight increase in the proportion of the variation in excess country indices that is explained by the industry factor. The latter evidence is consistent with the empirical findings of Beckers, Connor and Curds (1996) that industry effects grow with a finer definition of industry sectors.

Further, Griffin and Karolyi argue that industries should be grouped according to the tradability of their products because they may have different levels of risk exposures to the global factors, such as the global industry factor. Thereby, industries have been categorized into traded and non-traded goods groups according to the definition by Bodnar and Gentry (1993). They find that traded goods are, on average, indeed have more exposures to their industry-specific factors than their non-traded goods counterparts. This empirical finding is also confirmed by follow-up studies of Griffin and Karolyi (1998) and Griffin and Stulz (2001). Both studies show that the impact of the industry factor in non-traded goods industries is negligible in the economic sense. Diermeier and Solnik (2001) also show that the sensitivity of individual security returns to non-domestic factors is closely related to the extent of their international activities.

Overall, early studies on the roles of world, country and industry factors in developed markets conclude that the industry factor, even within the economically and financially integrated European markets (e.g., Heston and Rouwenhorst (1994); Heston and Rouwenhorst (1995); Rouwenhorst (1999)) plays a minor role in explaining the variation in international security returns. Unfortunately, the conclusion is based on the analysis within a static framework, such as variance ratio analysis with variances for each factor being computed over the full sample period. Such methods may lead to less reliable conclusions because they fail to capture the dynamics of each factor in the world capital market. In contrast, recent studies, with a focus on the evolutionary role of industry and country factors, have shown that the industry factor is as important as, or even more important than the country factor in determining international security returnss.

The study of Cavaglia, Brightman and Aked (2000) is a case in point. With an extended sample of countries, they conclude that for the purpose of portfolio risk reduction, the industry factor is more important than the country factor. Unlike previous studies where mean absolute deviations (MAD) averaged across the absolute values of industry or country factors are used as proxies for the relative strength of each factor, Cavaglia, Brightman and Aked have proposed the value-weighted mean absolute deviations (WMAD) instead. By plotting 52-week moving averages of industry and country WMADs from January 1, 1986 through November 3, 1999, they (Figure 1, p. 48) find that the country factor dominates the industry factor during the early sample period, consistent with the study by Rouwenhorst (1999). However, during the period from early-1997 to 1999, the industry factor has risen in its importance relative to the country factor. This latter evidence is robust to a refined industry classification system of 21 industries that is classified according to the economic fundamentals of rather than the historical correlation matrix of the constituent securities in an industry (see Figure 2 of their study). Further, with a 52-week time series plot of the correlation coefficients for the capitalization-weighted factor premia, they have shown that the correlations between country factors have been increasing during the sample period and in tandem with the increasing economic integration among 21 developed stock markets. In contrast, the correlations between industry factors are comparatively stable, especially during the later sample period (see Figure 3 of their study). They conclude that the gains from the geographical diversification have diminished relative to the diversification across global industries during recent years. Their results are also confirmed by Baca, Garbe and Weiss (2000), who report, with 48-week moving WMADs, an increased role for the industry factor in explaining the variation in international security returns within seven largest stock markets that are closely integrated with the world capital market. Their study also finds that in these markets, the impact of the industry factor is roughly equal to that of the country factor during the later sample period.

Several empirical studies have also modified Heston and Rouwenhorst's (1994) cross-sectional dummy variable regression model and examined the estimated industry and country factors in association with other issues, such as regional integration (e.g., Serra (2000)), fundamental effects[15] (e.g., Beckers, Connor and Curds (1996); L'Her, Sy and Tnani (2002); Kuo and Satchell (2001)) and the new economy effect (Brooks and Catao (2000)).

A recent study by L'Her, Sy and Tnani (2002) has extended the early works of Beckers, Grinold, Rudd and Stefek (1992) and Grinold, Rudd and Stefek (1989) by using four global fundamental risk premia, i.e., world market, size, value, and momentum, to control the differences across individual security returns. Therefore, cross-sectionally, Heston and Rouwenhorst's (1994) model is augmented as follows:

[15] Multifactor models can be roughly categorized, according to Connor (1995), into three types, i.e., macroeconomic, fundamental, and statistical factor models. Fundamental models, as described in [Connor (1995), p.42], are these models that "rely on the empirical finding that company attributes such as firm size, dividend yield, book-to-market ratio, and industry classification explain a substantial proportion of common return." Statistical models, as described in Connor (1995), are these models that "use various maximum-likelihood and principal-components-based factor analysis procedures on cross-sectional/time-series samples of security returns to identify the pervasive factors in returns."

$$R_{j,t} = \alpha_{w,t} + \alpha_{w.MKT,t}\hat{\delta}_{w.MKT,t} + \alpha_{w.SMB,t}\hat{\delta}_{w.SMB,t} + \alpha_{w.HML,t}\hat{\delta}_{w.HML,t}$$
$$+ \alpha_{w.WML,t}\hat{\delta}_{w.WML,t} + \sum_{j=1}^{J}\beta_{j,t}I_{j,t} + \sum_{k=1}^{K}\gamma_{k,t}C_{k,t} + e_{j,t} \quad , \tag{2.9}$$

where, $\hat{\delta}_{w.MKT,t}$ is the risk premium for the world market portfolio; $\hat{\delta}_{w.SMB,t}$, $\hat{\delta}_{w.HML,t}$, and $\hat{\delta}_{w.WML,t}$ are the risk premia for three global zero net investment portfolios (or, factor mimicking portfolios) for size (small minus big), value (high minus low), and momentum (winners minus losers) respectively; $\alpha_{w.MKT,t}$, $\alpha_{w.SMB,t}$, $\alpha_{w.HML,t}$, and $\hat{\delta}_{w.WML,t}$ are their corresponding coefficients for four global risk premia; and, $\alpha_{w,t}$ is the global risk factor which is not explicitly captured by the four global factors.[16]

With Equation 2.9, L'Her, Sy and Tnani show that the country factor declines in its importance relative to the industry factor during the period of 1992-2000. When combined with the global factors, their results show that the global factors have increased their importance in their sample of countries during 1990s; they even outweigh country and industry factors in the year of 2000. After a closer examination on the main sources of the variation in global factors, they find that the increasing importance of global factors stem from the global market and size factors. Their results are quite robust to different granularities of the industry classification system and different country grouping strategies. They conclude that "[the] benefits of international diversification have been significantly declining in more recent years, particular[ly] in 2000" (p.6); and, "it is best to consider all three dimensions—country, industry, and global risk factors—in constructing portfolios" (p. 8).

Kuo and Satchell (2001) have also implemented a comprehensive study on the global size and value factors in association with industry and country factors but with a

[16] In order to estimate the Equation 2.9, the four global risk premia must be estimated. L'Her, Sy and Tnani (2002) have employed a two-step procedure. In the first step, they use the same method as Fama and French (1993) to construct the global risk factors (see Appendix of that paper, p. 8 for details) by sorting the securities into different groups according to different breakpoints for different global factors based on the financial ratios computed on the previous fiscal year. Then the loadings for each factor are computed on a rolling window strategy. In the second pass, they run the regression in Equation 2.9 cross-sectionally in the same way as Heston and Rouwenhorst's (1994) to estimate coefficients for each factor. From this two-step estimation, the cross-sectional variation of security returns are separated into different effects and the evolution of each component are studied via variance ratios on a non-overlapping sub-period basis. Further, they use Equation 2.9 to examine which global risk factors are more important in explaining the variations of international security returns.

different approach from the extended dummy variable regression model used by L'Her, Sy and Tnani (2002). In their study, Kuo and Satchel postulate a cross-sectional decomposition of the return on security i that belongs to jth quartile size portfolio, kth-quartile value portfolio, lth industry, and mth country (Equation 1, p. 11):

$$R_{i,t} = \alpha_t + \varphi_{j,t} + \upsilon_{k,t} + \beta_{l,t} + \lambda_{m,t} + e_{i,t} \quad , \tag{2.10}$$

where, $\varphi_{j,t}$ is the global size effect and $\upsilon_{k,t}$ is the global value effect.

In order to obtain size- and value-based groups as in the study by Fama and French (1992), Kuo and Satchell first sort their universe of individual securities cross-sectionally into four groups according to a standardized market capitalization (p. 7) for size portfolios and according to financial ratios (Footnote 2, p. 7) for value portfolios in each market. Then, Equation 2.10 is run cross-sectionally across their universe of security returns. Using monthly excess returns for all securities included in MSCI indices and grouping them into four size-based, four value-based, six countries, and seven broad industries, they find that during the period of 1980-1995, the country factor dominates other three factors; among the other three factors, the industry factor dominates the size and value factors. After removing the country and industry factors in the cross-section security returns, their variance ratio analysis shows that the size premium is more pronounced than the value premium. These results are also robust to numeraire currencies used to compute excess security returns and robust to the different financial ratios used to sort individual securities into size and value portfolios.

Brooks and Catao (2000) have explored the impact of the globalization process and the introduction of "new economy," represented by the information technology industry, on the changing importance of industry factor in explaining the return variation. In the first place, Brooks and Catao have addressed a key deficiency of Heston and Rouwenhorst's model specification, i.e., the ignorance of interactive terms of industry and country factors, by introducing a quintile size dummy to control the fact that same industry in different countries is different from each other. Their model has been applied to a dataset that covers up to 5,507 securities in 21 developed and 19 emerging markets over the period from March 1986 to August 2000. They find that the importance of the global factor, as proxied by the intercept from the dummy variable regression model, and global industry factor, have increased in their importance since the mid-1990s by examining the average marginal R^2s of the restricted and unrestricted models. The country factor associated with developed markets has lost its explanatory power over the sample period. Meanwhile, the country factor in emerging markets, however, has increased their importance in the wake of the financial crises of late-1990s. Brooks and Catao suggest that the increasing role of global factor in explaining the return variation in their sample can be a spurious result as stock markets, especially emerging markets, are highly correlated during the crisis periods. Unlike Heston and Rouwenhorst (1994) who find only 7 percent of return variation can be explained by the industry factor, their study show that the industry factor accounts for, on average, about 28 percent of the return variation in developed markets from mid-1997 and afterwards. They argue that the increased importance of the industry factor in their study can be attributed to the information technology industry, which far outpaces other industries in explaining the return variation. This evidence is quite robust for both equal- and value weighting constraint specifications and for regressions with or without the participation of the quintile size dummy. Such a phenomenon is global in nature rather than limited in developed markets. Brooks and Catao coin this phenomenon as the "new economy" effect. They conclude that the growing importance of the industry factor in recent years is mainly due to the disparate behavior of information technology stocks and their comovement across stock markets during late-1990s.[17]

Almost all of the existing studies have examined the relative importance of industry and country factors in the context of developed markets, which are believed to be closely integrated with the world capital market. Little has been done for the emerging markets. Given the increasing importance of emerging markets as an ingredient of portfolio diversification strategies for international investors and the increasing globalization of world financial markets during recent decades, it is claimed that global factors may supersede local factors in pricing emerging market stocks. As a result, the conventional strategy to diversify across borders may not work any more for emerging markets; instead, a strategy based on global outlook, such as a diversification

[17] However, as recognized by Brooks and Catao, their findings can be provisional in nature because no solid evidence confirms that the increasing importance of new economy has fundamentally changed the nature of the economy. Further, judged from the sample period they have used, their worry may be true since most of the sample period coincides with the high-tech bubbles during late 1990s and early 2000s. The other weakness associated with their study is that they do not consider the investibility of the subject stocks. Thus, for international investors, it may be not possible to exploit these empirically-documented benefits.

across industries, along with countries (e.g., Cavaglia and Moroz (2002)) may generate more benefits than a strategy focusing on the cross-country diversification.

In order to address the above issue, Serra (2000) has launched a study focusing on a group of emerging markets in Emerging Market Database (EMDB) during the period of January 1990 to December 1996 within the framework of the study by Heston and Rouwenhorst (1994). Based upon the variance ratio analysis over the full sample period, she finds that emerging market returns are mainly driven by their respective country factors, consistent with previous studies in mature markets. And the cross-market correlation is not affected by the different industrial compositions of each market. With a finer industry partition, she finds that although the country factor still dominates in emerging markets, the industry factor seems to have gained a footing against the country factor. She concludes that "ignoring industrial diversification leads to an important loss of diversification benefits" (p. 148).

Given the empirical evidence with respect to the increasing regional integration among emerging markets, Serra (2000) has extended the dummy factor model to examine the regional effects in the following fashion:

$$R_{j,t} = \alpha_t + \sum_{j=1}^{J} \beta_{j,t} I_{j,t} + \sum_{k=1}^{K} \delta_{k,t} A_{k,t} + e_{j,t} \quad . \tag{2.11}$$

where, $R_{j,t}$ is the individual security return; $A_{k,t}$ and $I_{j,t}$ are the dummy for region k and industry j, respectively. With Equation 2.11, she finds that the regional factor is far less important than the country factor in her sample of emerging markets.

2.7 Chapter Summary

Both international asset pricing theories and related models suggest a multifactor structure governing international security returns. According to existing literature, these priced factors can be roughly categorized into world, country and regional factors. However, the importance of each factor in determining the variation in realized international security returns is time-varying and conditional on the assumption on the dynamic integration level of world and regional capital market (e.g., Bekaert and Harvey (1995)). A recent strand of literature, notably the works by Roll (1992), Heston and Rouwenhorst (1994), Griffin and Karolyi (1998), Baca, Garbe and Weiss (2000) and Cavaglia, Brightman and Aked (2000) among others, has hypothesized that industry factor may have become an important factor in explaining the variation in the realized international security returns due to the increased globalization of the world economy and the world capital market during recent decades.

Following the theories, numerous studies have sought to find the appropriate proxies for the industry, country, regional and world factors that best capture the variation in realized international security returns. Provided that there are a limitless number of pre-determined macroeconomic/market-wide variables as potential candidates for the empirically-documented priced factors, it is difficult to measure each factor in a full agreement with the theories and the selected proxies are usually intermingled with other factors. Thanks to Suits (1984) and Kennedy (1986), a family of Heston and Rouwenhorst (1994) style dummy variable regression models have been employed to extract each factor that are orthogonal to each other by model construction and examine the contribution of each factor to the variation in realized international security returns. With this model specification, the empirical studies in 1990s show that the country factor, on average, dominates the industry factor. This stylized fact is more prominent in emerging markets, which are believed to be less integrated with the world capital market as a result of the various forms of investment barriers in these markets. Counteractively, a couple of studies with the exclusive focus on developed markets also corroborate the dominance of the country factor in their respective stock markets. In contrast, later studies, mostly via time series plots of each factor in their absolute aggregate forms, have revealed that industry factor may be an important contributor to the formulation of international security returns during some periods of 1998-2000.

However, imperfections also exist in previous studies. First of all, most previous studies have exclusively focused on either a sample of developed markets or a sample emerging markets. No comparative study has been done on the different performance of each factor within the same framework. Secondly, variance ratio analysis has been harnessed to examine the relative importance of each factor in determining the variation in international asset returns. Since the variances that are sensitive to the presence of outliers have been used to compute the variance ratios, the analysis results thereby only provide a rough picture on the contribution of each factor to the realized market returns and volatilities. Further, though the study of Serra (2000) has extended the dummy variable regression to extract regional factor, yet, the estimated regional factor is not a "pure" factor in the sense of Heston and Rouwenhorst (1994) due to the contamination of other common factors, such as world factors. On the other hand, the estimated industry factors from a sample consisting of regional or emerging markets cannot be qualified as "global" industry factors for the reasons that (1) the increased integration of regional markets that produces regional rather than global industry factors; or, (2) the masking effect from the country factor that diminishes the role of the industry factor in emerging market returns. Finally, within the dynamic framework, only time series plots of rolling averages are provided for each aggregate factor. As aforementioned, rolling averages and variances/standard deviations are quite sensitive to outliers. Thereby, the conclusions based on a small-size rolling window may be unreliable, if the sample period is quite volatile or emerging markets are included in the sample that most likely produce outlier observations. Moreover, given the possible relationship between the importance of industry factors and the business environment, no existing studies have explicitly addressed this issue in association with global business cycles.

This thesis seeks to find the possible answers to the above listed imperfections in existing studies within the framework of Heston and Rouwenhorst (1994) for: It takes account of the varying integration issue since the cross-sectional coefficients for the dummy variables are used to represent each factor. Moreover, this model specification avoids the arbitrary specification of the priced factors within the model.

CHAPTER III

RESEARCH METHODOLOGIES AND HYPOTHESES

3.1 Introduction

The primary research interest of this thesis is to investigate the relative importance of industry, country and/or regional factors in determining the variation in realized (stock) market returns and volatilities, which are two important input parameters for portfolio theory. As outlined in the previous chapter, this issue has been considered by a number of researchers but with inconclusive results. For example, within a static framework, early studies (e.g., Heston and Rouwenhorst (1994); Griffin and Karolyi (1998); Heston, Rouwenhorst and Wessels (1999)) generally conclude that the country factor dominates the industry factor. However, later studies, with sample periods covering late 1990s or early 2000s (e.g., Baca, Garbe and Weiss (2000); Cavaglia, Brightman and Aked (2000); L'Her, Sy and Tnani (2002)) and each factor being considered within a time-varying framework, advocate that the industry factor has been growing in its importance and even has dominated the country factor in pricing the market returns during recent years. The methods used in this thesis further extend previous research by considering a much broader range of stock markets that include both developed and emerging (stock) markets and by devising an enhanced methodology that enables the regional influences to be measured and examined along with country and industry factors in a sample of possibly regionally-segmented emerging markets.

The remainder of this chapter is organized as follows. Major hypotheses and the associated research methodologies employed to examine the relative importance of industry and country factors in determining the market performance are outlined in Section 3.2. Section 3.3 will focus on the role of the regional factor in emerging markets. Section 3.4 concludes the chapter with a summary of the methodologies and the major contributions of this thesis to the existing literature.

3.2 Industry Factor versus Country Factor in Market Performance

Before proceeding to answer the question regarding which factor is important in determining the market performance, an appropriate proxy for the industry factor should be targeted. As reviewed in Chapter 2, different measures are proposed in existing studies as the proxy for the industry factor. For example, early studies in 1970s have focused on the variance-covariance matrix of the realized security returns with statistical tools of principal component analysis, cluster analysis, among others. Strong assumptions, however, have to be presumed before a researcher proceeds to analyze the results. Later studies, such as by Lessard (1974) and Drummen and Zimmermann (1992), have used realized raw industry returns as a proxy for the respective industry factors. Unfortunately, industry returns contain not only the unique industry factor that is specific to an industry, but also other factors that are common all stocks listed in a market, such as the world market factor (Heston and Rouwenhorst (1994)). Therefore, raw industry returns are less an ideal proxy for the industry factor. Instead, Roll (1992) has given a comprehensive analysis on the reason why the technical aspect of the aggregate market index for a country may lead to the presence of the industry factor in that market. Thereby, he suggests that the industry concentration ratio may be used as a candidate for the industry factor and shows that this ratio does have some relationship with the realized market volatilities. As a first step, this thesis also explores the relationship between the industry concentration ratio and the realized market volatilities.

3.2.1 Hirschman Concentration Indices and Realized Market Volatilities

Existing studies suggest different methods to capture the industry concentration phenomenon in a stock market (see Appendix A.1). In this thesis, Herfindahl-Hirschman Concentration Index (HCI) is preferred to Concentration Ratio (CR) as a proxy measuring the industry concentration phenomenon in a market for two reasons: (1) Not all industries are well represented in the markets surveyed in this thesis. Hence, it is quite difficult to arbitrarily select several benchmark industries to compute CR due to the under-representation problem. Furthermore, as a result of the privatization of state-owned enterprises (SOEs) in developing countries during recent years, there are significant changes in the industrial structure of emerging markets. Some of these recently publicized SOEs dominate emerging market performance due to their huge market capitalization. In order to capture such a possible change in the market, the HCI is chosen which is insensitive to such significant changes. (2) HCI has also been used in the work of Roll (1992) as one of two measures[18] to capture the industry concentration phenomenon in stock markets. The HCI for market j at time t is given by:

$$HCI_{j,t} = \left[\sum_{i=1}^{N} \left(\omega_{i,j,t-1} \times 100 \right)^2 \right] / 100 \qquad (3.1)$$

where, $\omega_{i,j,t-1}$ is the market capitalization proportion of industry i in the index of market j at time $t-1$, and N is the total number of industries in that market. Hence, if the computed HCI is close to zero, it implies that there is no industry concentration in a given market; when the HCI is close to 100, it implies a very industrially concentrated market.

The first hypothesis concerns the ability of Herfindahl concentration indices (HCIs), as a proxy for the industry factor due to the industry concentration phenomenon in a given market, to explain the disparate volatility patterns in each market:

Hypothesis 1: Can HCIs be used to explain the disparate volatility behaviors of each market?

The HCIs are computed from market capitalization for all industry sectors within each market. To ascertain whether the observed volatility of market returns[19]

[18] In Roll (1992), he also suggests using the number of individual stocks in the country index to compute the concentration ratio. Unfortunately this measure cannot be used in this study due to: (1) the incomplete history of number of equity (DS: NE) in some sample countries as provided in FTSE All-World Index series; and, (2) Unavailability of lists of constituent companies.

[19] The relationship between market returns and HCI measure will not be examined in a linear formulation for the reason that the possible values for returns could be ranging from negative infinity to positive infinity, whereas for HCI measure in our study, ranging from 0 to 100. Hence, unless a non-linear functional is formulated, the linear regression results are meaningless for analysis in our context.

may be due to the technical aspect of the index construction, a set of time-series regressions are fitted for each market in the following form:[20]

$$\ln(S_j) = b_0 + b_1 HCI_j, \quad j = 1, \ldots, 33 \tag{3.2}$$

where, HCI_j is the Herfindahl concentration index for market j, at the beginning of the synthetic week (Wednesday-to-Wednesday), and S_j is the squared realized market returns denominated in U.S. dollars, a proxy for the weekly volatility. The HCIs for each market are computed using both broad and refined industry classification. The natural log formulation is to ensure the positiveness of the dependent variable (volatility). Separate regressions like Equation 3.2 are applied, in a time-series fashion, to all 33 markets with all available observations.

Unfortunately, as argued by Roll (1992), HCIs only provide a rough picture of the influence of industry structure on a market since this measure only gives the average proportions of constituent industries for a given market instead of the performance of each industry therein. Hence, a more precise analysis is invited via different proxies for industry factors. In order to address the deficiency in using HCI as a proxy for the industry factor, Heston and Rouwenhorst (1994) have suggested a simple dummy variable regression model to decompose each cross-sectional market return into its industry and country components. Further, Griffin and Karolyi (1998) have demonstrated that, with aggregate industry (index) returns, as long as weighted least squares (WLS) regression is used to decompose industry returns into their orthogonal industry and country components via the dummy variable regression model of Heston and Rouwenhorst (1994), the estimated factor loadings for each factor are identical to those estimated from individual securities. The following section outlines this dummy variable decomposition method.

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[20] Roll (1992) has suggested using the standard deviation of daily returns within a month as the proxy for monthly volatility. In our study, however, this approach does not work because weekly frequency is used in which only five trading days (in maximum) are available for computing the required standard deviations. Small sample bias will definitely introduce to the computed statistics as a proxy for weekly volatility measure. Alternatively, the squared market returns are used as a rough proxy for weekly volatility measure. Such a methodology is inspired by the common practice in identifying ARCH/GARCH model that plots of squared returns are generally used as the proxy for the volatility of the given data series to examine ARCH/GARCH effects. Of course, the accuracy of such an estimate is questionable.

3.2.2 Decomposition of Realized Market Returns into Industry and Country Components

Following Heston and Rouwenhorst (1994), this thesis assumes that a given industry return can be decomposed into three components cross-sectionally, i.e., a world market factor (α), a global industry factor (β), a country-specific factor (γ), and a disturbance term (e) specific to the industry in that country. Therefore, the return on industry j belonging to country k at time t is given by:

$$R_{j,k,t} = \alpha_t + \beta_{j,t} + \gamma_{k,t} + e_{j,k,t} \quad . \tag{3.3}$$

Defining an industry dummy I_j that is equal to one if the industry return belongs to industry j and zero otherwise; and, a country dummy C_k that is equal to one if the industry return belongs to country k and zero otherwise, for each week t. Equation 3.3 can be presented in a cross-sectional dummy variable regression model for each industry return of country k and industry j every week t:

$$R_{j,k,t} = \alpha_t + \sum_{j=1}^{J} \beta_{j,t} I_{j,t} + \sum_{k=1}^{K} \gamma_{k,t} C_{k,t} + e_{j,k,t} \quad , \tag{3.4}$$

where, $R_{j,k,t}$ is either U.S. dollar-denominated industry return of industry j in country k in a given week t; α_t is the intercept term, which is translated as a benchmark for the performance common to every industry index in the world in week t; J is the total number of industries within an industry classification system; K is the total number of constituent countries in the sample; β_j and γ_k are the pure industry and country factors for industry j and country k respectively, relative to the benchmark world market return; and, $e_{j,k,t}$ is an idiosyncratic term specific to industry j in country k that cannot be explained by the other regressors.

The use of WLS regression can not only estimate industry and country factors from value-weighted industry returns that are identical to those estimated from individual security returns; it can also improve the efficiency of the factor loadings for industry and country factors. According to Griffiths, Hill and Judge (1993), WLS can be used to control the heteroscedasticity problem due to the under-representation problem in industry indices.[21]

With full number of dummies, it is impossible to estimate Equation 3.4 directly by the cross-sectional regression, because of perfect multicollinearity among dummy variables. In other words, the industry dummies and the country dummies add up to a unit vector across industry returns. One way to solve this problem is to arbitrarily pick up one industry and one country as benchmarks and run the regression. However, the coefficients estimated from this method are quite difficult to interpret effectively. Especially, in a model with many so many sets of dummy variables, the conventional approach to interpreting each coefficient as a relative measure to the benchmark does not sound instinctive. Alternatively, it is more intuitively appealing to ask how each industry or country differs from an average performance. Hence, in order to uniquely identify each factor, this thesis follows the suggestion of Kennedy (1986) and Suits (1984) to estimate Equation 3.4 cross-sectionally subject to the following set of constraints:

$$\sum_{j=1}^{J} \omega_{j,\,t-1}\beta_{j,\,t} = 0 \ , \tag{3.5}$$

$$\sum_{k=1}^{K} \omega_{k,\,t-1}\gamma_{k,\,t-1} = 0 \ ,$$

and,

$$\sum_{k} \omega_{k,\,t-1} = \sum_{j} \omega_{j,\,t-1} = 1 \ ,$$

where, $\omega_{j,\,t-1}$ and $\omega_{k,\,t-1}$ are the capitalization weights of industry j and country k at t - 1 to t.

By model construction, the residuals in Equation 3.4 are orthogonal to all industry and country dummies. Notice that the industry and country dummies are intercept dummies. Heston and Rouwenhorst (1994) demonstrate that the weighted

[21] In some markets, especially in emerging markets, industry index is only represented by one firm. In this regard, heteroscedasticity may exist because of the introduction of firm-specific variation in industry indices.

sums of residuals are all zeros for each industry and each market. As a result, the intercept term, α_t, has the expedient explanation as the return on the value-weighted world market portfolio. Accordingly, the estimated coefficients for each factor can be interpreted as deviations from the benchmark. From the perspective of portfolio analysis, the industry factor can be viewed as a portfolio heavily concentrated in that specific industry, with a zero exposure to other industries and neutral on all countries, so is the country factor (see Heston and Rouwenhorst (1995); Cavaglia, Brightman and Aked (2000)).

In addition, the sum of the intercept and the "pure" industry factor for a specific industry, i.e., $\hat{\alpha} + \hat{\beta}_j$, could be viewed as an estimate of a return from a portfolio that is fully geographically-diversified and tilts to global industry j. This portfolio has the same market composition as the world benchmark portfolio, and therefore, free of the influence from the country factor. Similar arguments can also be applied to the sum of the intercept and the "pure" country factor for a specific market, i.e., $\hat{\alpha} + \hat{\gamma}_k$, that has the same industry composition of the world benchmark portfolio and hence is net of the impact from industry factor. With this interpretation in mind, in Section 3.2.6, the "pure" country returns for each market will be used to extract the regional factor in a two-stage decomposition procedure to facilitate an analysis on the impact of the regional factor on emerging market performance.

Finally, this cross-sectional estimation procedure also admits an exact decomposition of a value-weighted market return $R_{k,t}$, in each week, into a world factor that is proxied by the intercept, a value-weighted global industry factor that constitutes that market and a country-specific component $\hat{\gamma}_k$:

$$R_{k,t} = \hat{\alpha} + \sum_{j=1}^{J} \omega_{j,k,t-1} \hat{\beta}_j I_{j,k,t} + \hat{\gamma}_{k,t} \tag{3.6}$$

Equation 3.6 states that a market performance is different from the world capital market for two reasons. First, the industrial composition of market k is different from the industrial composition of the world market. In other words, if market k is concentrated in industry j and this sector outperforms other sectors, keeping all else equal, market j will exhibit a stronger industry factor than other markets. Second, the difference is due to a set of local factors specific to market k, i.e., country factor.[22]

However, the simplicity of the model specification, as in Equation 3.4 through Equation 3.4, also has its price. First, since dummy variables are used to represent each factor, Heston and Rouwenhorst's methodology implicitly assumes that risk exposures are equal for each country and industry, and fixed over time. This assumption, however, could be somewhat unrealistic representation of economic phenomena in that same industry in different markets could have different level of exposures to global industry-wide shocks conditioning on the integration level of this local industry to the global one. Numerous empirical studies have shown that factor betas are time varying in nature and hence each security has different exposures to the common set of market/industry innovations throughout the time. Hence, the explanatory power of empirical results is also contingent on the extent to which the simplified assumptions would capture the economic reality.

Second, as admitted by Heston and Rouwenhorst, this model specification rules out any interaction between the factors. Furthermore, although the estimates are unbiased, they are nonetheless inefficient. This inefficiency becomes even worse for a study using industry returns with much fewer cross-sectional observations than a study using individual stocks. As a result, this estimation technique tends to over-estimate the coefficients' standard errors, often resulting in estimates that are not statistically different from zero and time-series volatility measures of those factors are also overestimated. Therefore, a test of explanatory power of each factor estimated from the above model specification, via a comparison of time series average R^2s, as done in Grinold, Rudd and Stefek (1989), L'Her, Sy and Tnani (2002), and Beckers, Connor and Curds (1996), will produce spurious results regarding the relative strength of each factor in determining the variations of international security returns.

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[22] In a similar fashion, value-weighted industry return, $R_{j,t}$, in each week, can also be decomposed into a world factor proxied by the intercept, the weighted-average country factor the constitutes that industry, and an industry-specific component $\hat{\beta}_j$:

$$R_{j,t} = \hat{\alpha} + \hat{\beta}_j + \sum_{k=1}^{K} \omega_{k,j} \hat{\gamma}_{k,t} C_{i,k,t}$$

Given the focus of this thesis is on the contribution of each factor to the variation in market returns, the impact of each factor in value-weighted industry returns is largely ignored.

With the estimated industry and country factors from Heston and Rouwenhorst (1994) style dummy variable regression model, the relative strength of each factor in 33 representative major stock markets will be examined under the following hypothesis:

Hypothesis 2: Which factor, i.e., industry factor versus country factor, is more important in explaining the variation in the realized market returns and volatilities during the sample period of 1994-2003?

In order to address this hypothesis, the alternative measures suggested in the previous research are summarized with their relative strengths and weaknesses. Then, following the spirit of Roll (1992), two regression-based analyses are proposed to test the relative importance of industry and country factors in each market.

3.2.3 Alternative Measures Used in Previous Research to Examine the Relative Importance of Industry and Country Factors in Realized Market Performance

In this section, alternative measures of relative importance of industry and country factors in market performance that have been employed in previous research will be examined. They can be summarized into four major methods.

Nearly all authors, such as Beckers, Connor and Curds (1996), compare the average R^2 statistics[23] to measure the extent to which the cross-section variation of international security returns can be explained by industry and country factors, where different factors are added to the model. Given that the regressors in Equation 3.4 are orthogonal to each other by model construction, a comparison of average R^2s allows examining the difference in *marginal* contribution of the omitted factors to explaining returns in a given period. Unfortunately, this approach cannot be used in this thesis for several reasons. First of all, only value-weighted industry returns are available to this thesis, and not all industries are well represented in most sample markets. As a result, not enough cross-sectional observations to ensure that the test statistics, such as average R^2s, are comparable to each other as an indicator for explanatory power of each model specification. The second possible bias is introduced from the fact that within each

[23] Average R^2s are used a proxy for fitness of the model as well as the proportion of the security returns can be explained by factors (Drummen and Zimmermann (1992)).

market, some industries have shorter return history than that of the market. This phenomenon becomes worse when a refined industry classification is introduced. Hence, a regression that arbitrarily regresses market returns against proxies for the industry factor as in Roll (1992) along with a country factor *for the full sample period* and examines the marginal contribution of each factor to the variation in market returns through average R^2s will produce spurious conclusions because R^2s increases with the number of independent variables used in the regression.

The second measure used in existing literature is the variance decomposition approach, or variance ratio analysis. As aforementioned, one of the most attractive features of Heston and Rouwenhorst's (1995) approach is that it allows decomposing each country and each global industry return into their principal determinants. That is, for each market k, its value-weighted market returns can be expressed as a sum of world benchmark return, plus value-weighted global industry factors, proxy for the industrial composition, and a component specific to that market (a replicate of Equation 3.6):

$$R_{k,t} = \hat{\alpha}_t + \sum_{j=1}^{J} \omega_{j,t-1} \hat{\beta}_{j,t} I_{j,k,t} + \hat{\gamma}_{k,t} \quad ,$$

Since the estimated coefficients, i.e., $\hat{\alpha}_t$, $\hat{\beta}_{j,t}$, and $\hat{\gamma}_{k,t}$, are cross-sectionally orthogonal to each other and the betas are either zero or unity, the marginal explanatory power of each factor can be roughly measured by the factor variances. That is:

$$\operatorname{Var}(R_k) = \operatorname{Var}(\hat{\alpha}) + \operatorname{Var}\left(\sum_{j=1}^{J} \omega_{j,t-1} \hat{\beta}_j I_{j,k} \right) + \operatorname{Var}(\hat{\gamma}_k) \quad , \tag{3.7}$$

where, Var(·) is the variance operator.[24]

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[24] In a similar fashion, each value-weighted global industry return and its variance can be decomposed as follows:

$$R_{j,t} = \hat{\alpha}_t + \hat{\beta}_{j,t} + \sum_{k=1}^{K} \omega_{k,t-1} \hat{\gamma}_k C_{j,k,t} \quad ,$$

and,

$$\operatorname{Var}(R_j) = \operatorname{Var}(\hat{\alpha}) + \operatorname{Var}(\hat{\beta}_j) + \operatorname{Var}\left(\sum_{k=1}^{K} \omega_k \hat{\gamma}_k C_{j,k} \right) ,$$

where, Var(·) is the variance operator.

As Equation 3.7 shows, the variation of market returns can be roughly attributed to three sources. First component is the variation of the world market, $\hat{\alpha}_t$. The second source of the variation is due to local factors specific to country k (a country factor net of industry influence). And the third reason is because the industrial composition of country k differs from that of the world benchmark. For example, during mid-1990s, IT industry has witnessed both a short booming and bubble-bursting period relative to most of other industries due to irrational expectations of global investors on its future profitability, a market that is heavily concentrated in the IT industry will also perform, all other things being equal, excess volatility than other markets (see Brooks and Catao (2000) for the documented "new economy" effect). Particularly, if the industrial composition of a market is exactly the same as the world industrial composition, the resulting the industry factor would be zero for that particular market due to the constraint conditions in Equation 3.5.

Further, Equation 3.7 permits several interesting tests. For example, (1) it can be used to test on the integration of world capital market. If the world capital market has been becoming more integrated over time, the variance of the global factors—world and global industry factors—should gain their importance in explaining the variation in market returns relative to the variance of the country factor (Beckers, Connor and Curds (1996); L'Her, Sy and Tnani (2002)). (2) It can be used to test the relative importance of industry versus country factors to explain the variation in market returns once world common factors are under control (Heston and Rouwenhorst (1994); Griffin and Karolyi (1998)). (3) It can also help to identify which industry (country) arises in explaining the performance of a market (an industry) as in the study by Brooks and Catao (2000).

However, the variance decomposition approach has an important deficiency. When computing time series variances, it is assumed that each factor is independent of each other not only cross-sectionally but also across time. For the latter assumption, it is less likely to be true. Equation 3.4 does not guarantee that the estimated factors are orthogonal to each other across time, though the autocorrelation coefficients are expected to be low. This may come from the fact that in Equation 3.3, the dummies used to proxy for each factor are actually intercept dummies. The time series covariances are decided, in part, by the left hand side term of Equation 3.4—the industry returns used to extract each factor cross-sectionally. If industry returns are auto-correlated through time, the estimated factors will also be expected to exhibit autocorrelations through time, though less significant in their magnitude.

The third measure to examine the relative importance of industry versus country factors in explaining the variation in market returns is to compare the value-weighted mean (average) absolute deviation (MAD) of the coefficients β's and γ's (Heston and Rouwenhorst (1995); Rouwenhorst (1999); Griffin and Karolyi (1998); Cavaglia, Brightman and Aked (2000)). Formally, the industry and country MADs are defined as the absolute value of the estimated industry or country factors multiplied by their respective market capitalization at time $t-1$:

$$MAD_{j,t} = \sum_{j=1}^{J} \omega_{j,t-1} \left|\hat{\beta}_{j,t}\right| \tag{3.8}$$

$$MAD_{k,t} = \sum_{k=1}^{K} \omega_{k,t-1} \left|\hat{\gamma}_{k,t}\right|$$

where, $MAD_{j,t}$ and $MAD_{k,t}$ are defined as the MADs for global industry j and country k respectively at time t; $\hat{\beta}_{j,t}$ and $\hat{\gamma}_{k,t}$ are the estimates of industry and country factors from Equation 3.4 under constraint conditions of Equation 3.5; $\omega_{j,t-1}$ and $\omega_{k,t-1}$ are market capitalization weights of global industry j and country k at time $t-1$; and, J and K are the total number of constituent global industry groups/countries in our sample.

Despite its popularity among existing studies, this measure also has its pros and cons. On the minus side, value-weighted MADs put enormous emphasis on the U.S. and Japan, which together make up approximately, on average, 70 percent of total world market capitalization as in our sample. On the plus side, MADs will mitigate the spurious influence from the small, in terms of market capitalization, country (industry) with uncommon industry (country) structure.

Moreover, as suggested in Rouwenhorst (1999) and Cavaglia, Brightman and Aked (2000), value-weighted MADs can be considered as the opportunities of a global portfolio to outperform the benchmark world market portfolio with deliberate tilts towards a specific industry or country. Alternatively, value-weighted MADs can be regarded as "the value-weighted returns of 'perfect foresight' strategies that are exclusively based on either industry or country tilts" (Cavaglia, Brightman and Aked (2000), p. 46). In terms of portfolio management, MADs can also be regarded as the price for international portfolios that are only benchmarked to the world market portfolio, totally ignorant of the industrial composition of a given market or of the country composition of a given global industry

In summary, this section has discussed alternative measures used in existing literature to examine the relative importance of industry and country factors in stock markets as well as their associated strengths and weaknesses. Despite the limitations of those measures in capturing the full picture of each factor, each of these measures provides useful information and complementary to each other. In light of the weaknesses and strengths of each measure, this thesis will incorporate most of them, rather than single out one as done in previous research, in exploring the importance of industry, country and regional factors in explaining the variation in realized market returns.

3.2.4 Two Regression-based Approaches

As mentioned before, Heston and Rouwenhorst's (1995) approach assumes that each security has unit exposures to industry- and country-specific risks. As termed in factor pricing model, this approach implicitly assumes that the beta for each factor is unit and invariant during the full sample period. The former assumption is less an idea abstraction of the economic reality, neither is the latter one. The validity of the measures suggested in existing literature, such as variance ratio analysis, establishes on such an unrealistic assumption. As a result, these measures may be less successful to reveal the exact contribution of each factor to the realized market returns and volatilities. In order to address this issue, in the spirit of Roll (1992), a regression-based analysis is employed in this study, which assumes different level of risk exposures of realized market returns to each factor. Nevertheless, this is not a satisfactory solution, largely due to its ignorance of the well-documented time-varying nature of risk exposures. At least, the regression results could help to build up a partial understanding of the mechanism though which industry and country factors exert the impact on the market performance.

There are two problems related to the regression-based analysis. One problem is what should be used to represent industry factor. Grinold, Rudd and Stefek (1989) suggest that individual global industry returns may be used to proxy approximately the impact of each industry on a given stock market. This approach suffers the criticisms of Heston and Rouwenhorst (1995) that global industry returns are a poor proxy for industry factor because they include common world factors and may be biased by the country factor via the country concentration in that industry. In this study, as delineated in the following section, estimated factor loadings for the industry factor from the dummy variable regression model of Heston and Rouwenhorst's (1995) will be used to proxy for the innovations specific to their respective industries.

The other problem is how to augment industry factor into multifactor linear regression model. In Roll (1992), the estimated factor loadings for each industry[25] are used in a time series linear regression model along with currency risk for each market. Unlike his, this study employs value-weighted industry factor that are value-weighted from factor loadings of each industry estimated from the dummy variable regression model as the proxy for the difference in industrial composition of each market and its impact on average market returns and volatilities. The use of value-weighted industry factor has its advantages relative to the model specification by Roll (1992). For example, for Roll's model,[26] it is required that all industry indices should be available in each market during the sample period. Otherwise, the model will not be estimable on a full sample basis because of missing observations in some industries. Further, the regression will also report spurious *t*-statistics for the estimated coefficients and the explanatory power of the model, which make these indicators incomparable across different model specifications, due to different numbers of observations are involved. The value-weighted industry factor, on the other hand, avoids this problem. It ensures that full sample period of observations for industry factor is available in each market. Of course, this construction methodology also has its weaknesses. For example, with industry factor specified in its value-weighted form, it is assumed that realized market returns have the exposures to industry innovations according to their weights in a market.

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[25] In Roll's (1992) study, he uses "concurrent returns in seven broad Global Industry Sectors….*and fitted using returns only from other countries*" (p. 15).

[26] In Roll's (1992) study, three years of daily data and a broad industry classification system are used (seven broad industries in total). Hence, Roll's model is feasible in that all seven industry indices are available in all 24 countries he has studied through the sample period.

Further, this proxy may underestimate industry factor due to the smoothing effect introduced by the capital-weighting scheme. For instance, the innovation in IT industry might be over-smoothed in a market with considerably small weight in that industry. Nonetheless, this study has provided a feasible alternative to existing literature in examining the role of industry factor in explaining the variation in average realized market returns and volatilities.

A. Reinterpretation of the Estimated Factors in the Lingo of Multifactor Model

According to Heston and Rouwenhorst (1994), the estimated industry and country factors from their dummy variable regression model can be interpreted as deviations of each factor relative to a world benchmark return, i.e., the intercept. In a similar fashion, these estimates can also be translated as returns on zero-cost factor mimicking portfolios with maximum exposures to a specific industry or a country. This interpretation is justified by following reasons. First of all, the estimated coefficients are pure factor loadings as required in the multifactor model. As argued by Heston and Rouwenhorst (1994), the estimated factors are "pure" in the sense that they are not confounded with other common factors. For example, the country factor is free from the influence of world and industry factors. Therefore, the country factor is specific to the country under investigation, so is industry factor.

Second, by model construction, the estimated coefficients for each factor are orthogonal to the world benchmark return as well as to each other. Hence, if the estimated factors are augmented into a linear regression model, there will not exist the multicollinearity problem as it usually does in the case where prespecified macroeconomic/market-wide variables are used.

Finally, if weighted linear squares regression is applied to the dummy variable regression model (Equation 3.4), the estimated factor loadings are usually scaled by (see Equation 3.5, the constraint conditions) and recovered from market capitalizations of either individual securities or industry indices that are available at the beginning of an arbitrarily portfolio rebalancing period (see Kennedy (1986) and Suits (1984) for details). Thus, each estimate may be roughly regarded as the portfolio tracking errors for investors who closely follow world market portfolio without tilting towards one specific industry or country (Rouwenhorst (1999); Cavaglia, Brightman and Aked (2000)). From this perspective, these estimates may be translated as appropriate proxies for the unexpected component for industry and country factors, consistent with the IAPT. Nevertheless, how "unexpected" these estimated factor loadings are for their respective factors is still in question.

B. Average Market Returns and Factors

This section will explore the relationship between average market returns and the estimated industry and country factors in a linear regression fashion.

Equation 3.6 and arguments in previous section suggest that the value-weighted industry factor can be used as a proxy for the industrial composition specific to a market. By model construction of Heston and Rouwenhorst (1995), the value-weighted industry factor and country factor are also orthogonal to each other cross-sectionally. In order to examine the relative strength of each factor in explaining the variation in realized market returns, following Grinold, Rudd and Stefek (1989) and Roll (1992), three multifactor models are examined, with their explanatory powers, in terms of adjusted R^2s, being compared to the benchmark asset pricing model—ICAPM:

$$r_{k,t} = b_0 + b_1 r_{FTSE,t} + e_{k,t} \quad , \tag{3.9}$$

where, $r_{k,t}$ is the excess return of market k above a global risk-free rate; $r_{FTSE,t}$ is the excess return of a world market portfolio; and $e_{k,t}$ is the error term and $e_{k,t} \overset{d}{\sim} N(0, \sigma_{k,t}^2)$.

Starting from Equation 3.8, for each market, each factor is augmented sequentially into Equation 3.9 as follows:

$$r_{k,t} = b_0 + b_1 r_{FTSE,t} + b_i[\text{Factor(s)}] + e_{k,t} \quad , \tag{3.10}$$

where, [Factor(s)] represents value-weighted industry factor and country factor, or their combination, estimated from the dummy variable regression model. Note that unlike the IAPT in which expected (excess) market returns and unexpected component of the explanatory variables are used, in Equation 3.10, realized market returns are used to compute the excess market returns. As aforementioned, the focus of this study is on the contribution of each factor to the variation in realized returns, rather than expected market returns.

Compared to Roll's (1992) model specification, Equation 3.10 does not explicitly consider the role of currency risk in explaining the variation in realized market returns. As argued by Baca, Garbe and Weiss (2000), the country factor estimated from the dummy variable regression model presumably contains currency effect (see Footnote 1 therein). In one of the unreported regressions that has regressed the proxy for currency risk[27] against the estimated country factors for eleven developed markets also reveals a strong time series correlation (measured as R^2s) between the two. Hence, if currency risk is added into Equation 3.10, multicollinearity may exist between the estimated country factor and the proxy for currency risk, which will introduce biases into regression results.

Furthermore, in Equation 3.10, industry and country factors are examined in association with the proxy for world factors—returns on world market portfolio. Thereupon, the marginal contribution of each factor in the market performance can be examined via the increase in adjusted R^2s, once world factors, represented by the excess returns on world market portfolio above a world risk-free rate, are under control.

C. EGARCH Model

Volatility is an important input for portfolio management as well as pricing the primary and derivative assets. Further, Ross (1989) argues that the volatility can be regarded as a gauge of information flow within a market. Existing studies have shown that the volatility is predictable in many asset markets and a variety of approaches have

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[27] Currency risk is proxied by the log relative change of exchange rates in the same fashion as computing continuously compounded security returns (for details, see Chapter 4). That is:

$$R_t^{j/\$} = \log\left[X(j/\$)_t / X(j/\$)_{t-1}\right], \quad t = 1, \ldots, T$$

where $X(j/\$)_t$ is the exchange rate for the number of currency of country j per U.S. dollar at the close of trading on day t; and, $R_t^{j/\$}$ is the log relative change of the exchange rate of country j. $R_t^{j/\$}$ can be regarded as a return on the exchange rate. Roll (1992) has adopted the same measure to proxy the foreign exchange risk but in a discrete fashion (p. 15, Footnote 16).

been proposed on how the volatility should be modeled (see Bollerslev, Chou and Kroner (1992) for a survey).

Empirically, the family of GARCH models has been found very successful in capturing the stylized facts about the volatility of the financial time series, such as volatility clustering, fat-tailed empirical distribution, and mean reversion in volatility. Among them, a GARCH(1,1) process is preferred in most cases (Engle and Ng (1993); Bollerslev, Chou and Kroner (1992)). For example, conditioning on the existence of the fourth order moment of GARCH(1,1) process, Bollerslev (1986) has shown that kurtosis implied by a GARCH(1,1) process is greater than 3, the kurtosis of a normal distribution. This model has been further extended by Engle (1982) in an exponential formulation (EGARCH) to capture the leverage effect[28] discovered by Black (1976). Furthermore, another advantage of EGARCH model over the basic GARCH model is that conditional variance is guaranteed to be positive irrespective of the coefficients in the conditional variance equation because conditional variance is specified in logarithmic form. Of course, the use of EGARCH (1, 1) also has its limitations. For example, EGARCH models are parametric specifications that operate best under relatively stable market conditions. Although EGARCH is explicitly designed to model time-varying conditional variances, EGARCH models often fail to capture highly irregular phenomena, including *wild* market fluctuations, such as market crashes and subsequent rebounds, and other highly unanticipated events that can lead to significant structural change.

In order to study the importance of industry and country factors in determining the time-varying volatility of realized market returns, the EGARCH (p, q) model of Nelson (1991) is used for several reasons. First, this model specification allows augmenting its conditional variance equation with exogenous explanatory variables that are supposed to have somehow impacts on the conditional volatility without any transformation. Further, it also allows examining the well-documented leverage effect in market volatilities. The conditional variance equation is specified as follows:

[28] In statistical sense, this leverage effect occurs "when an unexpected drop in price (bad news) increases predictable volatility more than an unexpected increase in price (good news) of similar magnitude" (Engle and Ng (1993), p. 1752). The existence of "leverage effect" has been confirmed by the empirical findings of French, Schwert and Stambaugh (1987), Nelson (1991), and Schwert (1990), among others.

$$h_t = a_0 + [\text{Factor (s)}] + \sum_{i=1}^{p} a_i \frac{|e_{t-i}| + \theta_i e_{t-i}}{\sigma_{t-i}} + \sum_{j=1}^{q} b_j h_{t-j} \tag{3.11}$$

where, $h_t = \log(\sigma_t^2)$; e_t is the error term from the mean equation; and, $[\text{Factor (s)}]$ is one of the industry, country and regional factors or a combination of the three that are supposed to be exogenous to the system.[29]

The mean equation of the EGARCH (p, q) model is specified as the ICAPM (see Equation 3.9).[30] With these model specifications, the contribution of each factor to the unsystematic risk component that cannot be captured by world market portfolio—a proxy for the world factor—is examined. In order to select the "best" fitted model, Bayesian information criteria (BIC) are used along with conventional adjusted R^2 for each model per country. BICs are preferred to adjusted R^2s as an indicator for the "best" fitted model for the reason that adjusted R^2 penalizes the loss of degrees of freedom when a model is *expanded* and less powerful in the case in which the number of parameters in each model is identical. There is also some question regarding "whether the penalty is sufficiently large to ensure that the criterion will necessarily lead the analyst to the correct model (assuming that it is among the ones considered) as the sample size increases" (Greene (2003), p. 159). In contrast, BIC imposes a greater penalty for additional parameters than does adjusted R^2; and, BIC model selection criteria are based on parsimony, which means BIC "will lean toward a simpler model" (Greene (2003), p. 160). Further, since both factors are estimated from the realized security returns via the dummy variable regression model, from the perspective of principal component analysis, they can be largely considered as two major components of the realized international security returns that capture most of the variation therein (Brooks and Catao (2000)). As a result, the differences between adjusted R^2s for each model may be smaller in their magnitudes than do BICs. Consequently, in order to

[29] Of course, the validity of how "exogenous" these factors are is under question though.

[30] In an unreported part of this thesis, the mean equation of the EGARCH (1, 1) model has also been specified as an AR (1) process with the assumption that the residuals from the AR (1) model can be roughly interpreted as the new information arriving in markets that cannot be captured by the one-lag realized market return. Unfortunately, regression results indicate that the only a couple of markets have significant coefficients for their respective one-lag market return. Schwartz Bayesian information criterion (BIC) also suggests that this model specification may be misspecified relative to the EGARH (1, 1) model with its mean equation specified as the ICAPM model. Therefore, in Chapters 5 and 6 where empirical results are reported for EGARCH (1, 1) models, only a version with its mean equation specified as the ICAPM model is presented therein.

select models, BICs are preferred to adjusted R^2s. On the other hand, the individual performance of each factor in each model specification is determined by their respective t-statistics on the estimated coefficients.

Overall, two regression-based analyses in this section will be employed to examine the relative importance of each factor in explaining the variation in the realized market returns and in their conditional volatilities, along with the alternative measures listed in the previous section. In practice, different permutations of the estimated industry and country factors are augmented within the ICAPM: an ICAPM augmented by country factor, an ICAPM augmented by the value-weighted industry factor, and an ICAPM augmented by both the value-weighted industry factor and country factor, for each market. Similar specification is also used in the conditional variance equation of the EGARCH (1, 1) model (see Equation 3.11), with its mean equation specified as the ICAPM. That is:

$$
\begin{aligned}
&[\text{Factor (s)}] \xrightarrow{\textit{defined}} \text{Country Factor} \\
&[\text{Factor (s)}] \xrightarrow{\textit{defined}} \text{Indsutry Factor} \\
&[\text{Factor (s)}] \xrightarrow{\textit{defined}} \text{Indsutry Factor} + \text{Country Factor}
\end{aligned}
$$

3.2.5 Evolutionary Role of Industry and Country Factors

The measures used in the previous research and two regression-based analyses proposed in the previous section only provide a partial picture of the relative importance of industry and country factors in determining the market performance because the conclusions therein have been drawn upon a full sampler period analysis. Recently, some researchers have focused on the evolutionary role of industry and country factors in determining the variation of the international security returns. Most of these researches have employed a rolling window approach with different window sizes conditioning on the data frequency and the sample period covered therein (e.g., Baca, Garbe and Weiss (2000); Cavaglia, Brightman and Aked (2000)). Following the above trail, this study will also apply the rolling window analysis to the estimated industry and country factors from the dummy variable regression model of Heston and Rouwenhorst (1994) to address the following hypothesis:

Hypothesis 3: Has the industry factor gained its importance relative to the country factor in explaining the variation of the realized market returns during the sample period of 1994-2003?

Instead of examining each factor on a market-by-market basis that may be exhausting and tedious, like existing studies, each factor is presented in its aggregate form via two weighting schemes—equally- and capital-weighting schemes. In other words, each factor is evaluated from a global perspective. The aggregation is implemented as follows: For each week, absolute values (or absolute deviations as termed in Cavaglia, Brightman and Aked (2000)) of the estimated industry or country factors are either averaged or value-weighted, across its constituent industries and markets, which produce the composite industry and country factors. The two weighting schemes represent two global investment strategies, i.e., equally-weighted or value-weighted global portfolios, with a specific focus on the diversification either across industries or across markets. Moreover, as interpreted by Heston, Rouwenhorst and Wessels (1999) and Cavaglia, Brightman and Aked (2000), the aggregation results are measured against the benchmark world market performance—the intercept of the dummy variable regression model. Therefore, they can be approximately interpreted as the potential gains from investors' perfect sight of global industry and market movements.

Then, within each rolling period, simple arithmetic means[31] and standard deviations[32] are computed over these two aggregated time series. Given the focus of this thesis is on the contribution of industry and country factors to average market returns and volatilities, the computed means can be roughly interpreted as the proxy for the average performance of each factor, so do the standard deviations for the realized market volatilities.[33] In particular, the sample period covered in this thesis, i.e., the period from January1994 to June 2003, is much more volatile than that of previous

[31] Time series plots of rolling means/averages of absolute deviations, or rolling MADs, are also used in the study by Cavaglia, Brightman and Aked (2000) within a rolling window of 52 weeks.

[32] Time series plots of rolling variance is also used in Baca, Garbe and Weiss (2000) within a rolling window of 48 weeks.

[33] Of course, the use of simple rolling averages of standard deviations as proxies for volatility of each composite industry factor is questionable. It may be over-smoothed via an average taken cross-sectional as well as across time.

studies. For example, this sample period has witnessed several financial crises in emerging markets, 9/11 Terrorists Attack in the U.S., and unusual swings in IT industry. Therefore, during some rolling periods, some extreme observations may occur. The existence of the potential outliers, as a result, may produce spurious proxies for average performance and volatility of each factor in rolling windows that include these outliers. In order to mitigate the influence from outliers, one robust measure for location and one robust measure for dispersion are also computed as complement to the analysis based on means and standard deviations. They are medians and median absolute deviations (MADs) with the latter's centers defined as medians. Time-series plots for each statistic with a rolling window of 36 weeks are provided.[34] Although these statistics may not be adequate to address the above issue, at least, they have provided partial picture of the time-varying behavior of industry and country factors.

Further, each factor is also examined in association with global business cycles with the assumption that during recovery/expansion periods, the industry factor may dominate the country factor in explaining the variation international security returns.

3.2.6 Robust Checks with Different Granularities of Industry Classification Systems and Different Country Grouping Strategies

The relative importance of industry and country factors is determined, in part, by the integration level of a local market with world capital market. A couple of studies, for example, Baca, Garbe and Weiss (2000) and Cavaglia, Brightman and Aked (2000), suggest that the estimates for "pure" country and industry factors are sensitive to the sample markets included in a study. Unfortunately, this assumption has not been explicitly tested as a result of the data availability. Unlike the previous studies, Chapter 4 will show that the dataset used in this thesis has provided a unique opportunity to test the hypothesis: Both emerging and developed markets are included. Thus, the sample has been further divided into two sub-samples consisting of either 11 developed markets only or 22 emerging markets only. Each factor will be re-estimated therein. Via this way, disparate behavior of each factor will be examined in association with the integration

[34] Given the possibility that industry-wide shocks are relatively shorter-lived than the country factor for a given market, rolling windows of 12 and 52 weeks are also plotted for each statistic to facilitate the examination. In order to save space, time series plots are not reported in this thesis. Major results are largely the same as the time series plots within a rolling window of 36 weeks.

issue, with the assumption that developed markets are more integrated with world capital market then their emerging counterparts.[35]

Further, each factor will also be estimated from industry returns under two industry classification systems with different level of granularity, with the assumption that refined industry classification system may produce stronger industry factor than the broad one.

Thereby, the robustness of the empirical results can be verified. That is,

Hypothesis 4: Are the estimates of industry and country factors sensitive to the different country grouping strategy and the different industry classification system with different level of granularity?

3.3 Regional Factor in Emerging Market Performance

The major concern of this section is to examine the role of the regional factor in emerging markets during the sample period. That is,

Hypothesis 5: For emerging markets, does the well-documented regional factor become an important factor in determining the emerging market performance?

Existing literature in international finance has primarily focused on the world market integration issue; however, regional integration has been scarcely discussed. A conventional approach adopted by most of previous studies, for example, Heaney and Hooper (1999), is to use an aggregate regional index as a proxy for the latent regional factor.[36] It is obvious that such a proxy is only a rough measure of the regional factor since the proxy includes common global factors. Thereupon, it is difficult to discern

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[35] This method may also be qualified by the fact that divided as two country groups, the number of cross-sectional industry returns (observations) in each group is not so much different from each other: Measured as time series medians, 98 versus 140 "FTSE Economic Group" industry returns and 269 versus 234 "FTSE Industry Sector" industry returns for developed and emerging markets groups respectively.

[36] Principal component analysis has also been employed with the communality specific to all markets in a region interpreted as the proxy for regional factor (e.g., Bilson, Brailsford and Hooper (2001)).

which component of the regional index explains the variation in international security returns, let alone the possible multicollinearity problem between the regional index and world market portfolio if the ICAPM is used as benchmark model (Heston and Rouwenhorst (1994)).

Furthermore, different weighting schemes used to compute regional index also has some impact on the strength of the regional component in that index. If value-weighted regional index is used, the regional factor therein may be masked by the country factor of the market with a significant market capitalization in that region. On the other hand, if an equally-weighted regional index is used (e.g., Bilson, Hooper and Jaugietis (2000)), the abnormal performance of small-cap market may also introduce the country factor into the index.

In order to obtain a more precise measure, the dummy variable regression model of Heston and Rouwenhorst (1994) has been extended into a two-stage procedure[37] to estimate a "pure" regional factor relative to a world benchmark.

In the first stage, a given value-weighted market return is decomposed into its industry and country components via the dummy regression model of Heston and Rouwenhorst (1994):

$$R_{k,t} = \hat{\alpha}_t + \sum_{j=1}^{J} \omega_{j,t-1} \hat{\beta}_{j,t} I_{j,k,t} + \hat{\gamma}_{k,t} \quad .$$

Cross-sectionally, the sum of intercept $\hat{\alpha}_t$ and the corresponding country factor $\hat{\gamma}_{k,t}$ for market k is the "pure" country return and it is industry neutral (Heston and Rouwenhorst (1994), p. 12). However, this "pure" country return is not necessarily regionally neutral because of the "masking effect" from using dummy variable regression (see argument in Appendix A.2).

[37] Several methods have been proposed and tested to extract regional effects from industry returns. The details on each method are presented in Appendix A.2, accompanied by the reasons why they are off consideration in this study.

Therefore, in the second stage, the "pure" country return is assumed as a linear combination of three orthogonal components, i.e., the world benchmark portfolio, a regional factor and a country factor (the residual):

$$R_{k,t}^{\mathrm{adj}} = \alpha_t + \delta_{l,t} + e_{k,t} \quad , \tag{3.12}$$

where, for each time t, $R_{k,t}^{\mathrm{adj}}$ is the pure country return for market k corrected for industry factor, α_t is the return on world benchmark portfolio, $\delta_{l,t}$ is the regional factor for region l, and $e_{k,t}$ is the pure country factor adjusted for regional factor.

Defining a regional dummy A_l that is equal to one if the pure county return k belongs to region l and zero otherwise, for each week t, then Equation 3.12 can be represented in the cross-sectional dummy variable regression model for each pure country return:

$$R_{k,l,t}^{\mathrm{adj}} = \alpha_t + \sum_{l=1}^{L} \delta_{l,t} A_{l,t} + e_{k,t} \quad , \tag{3.13}$$

The WLS regression is run across markets for each week and subject to the following set of constraint:

$$\sum_{l=1}^{L} \omega_{l,t-1} \delta_{l,t} = 0 \quad , \tag{3.14}$$

and,

$$\sum_l \omega_{l,t-1} = 1 \quad ,$$

where, $\omega_{l,t}$ is the weight for region l computed by the market capitalization of constituent markets at time $t-1$.

Further, from Equation 3.3, the industrially-corrected market returns can also be rewritten as follows:

$$\hat{\alpha}_t^{adj} + \gamma_{k,t} = R_{k,t} - \sum_{j=1}^{J} \omega_{j,t-1} \hat{\beta}_{j,t} I_{j,k,t} \quad . \tag{3.15}$$

From Equation 3.13, the left hand side (LHS) of Equation 3.15 has been decomposed into a world market benchmark portfolio, a regional component and a country-specific component. Thus, Equation 3.15 can be rewritten as follows:

$$R_{k,t} - \sum_{j=1}^{J} \omega_{j,t-1} \hat{\beta}_{j,t} I_{j,k,t} = \hat{\alpha}_t^{\text{adj}} + \hat{\delta}_{l,t} + \hat{e}_{k,t} \quad . \tag{3.16}$$

The $\hat{\alpha}_t^{\text{adj}}$ in Equation 3.15 is used to represent the regionally-adjusted world market portfolio. The term $\sum_{j=1}^{J} \omega_{j,t-1} \hat{\beta}_{j,t} I_{j,k,t}$ in Equation 3.16 can be moved from LHS to the right hand side (RHS):

$$R_{k,t} = \hat{\alpha}_t^{\text{adj}} + \sum_{j=1}^{J} \omega_{j,t-1} \hat{\beta}_{j,t} I_{j,k,t} + \hat{\delta}_{l,t} + \hat{e}_{k,t} \quad . \tag{3.17}$$

That is, via Equation 3.17, the market return k of week t has been effectively decomposed into a world market benchmark portfolio, $\hat{\alpha}^{\text{adj}}$; a component due to the different industry compositions of each market, $\sum_{j=1}^{J} \omega_{j,t-1} \hat{\beta}_{j,t} I_{j,k,t}$; a regional factor, $\hat{\delta}$; and, a country-specific component, $\hat{e}$.

The creditability of using above procedure to decompose a market return into its industry, country and regional components is supported by the argument of Griffin and Karolyi (1998). In their study, Griffin and Karolyi argue that the estimated coefficients from aggregate index returns still generate unbiased estimates for each factor, as long as WLS regression is used and each index is aggregated from its constituents via the capital-weighting scheme. As a result, following this line of argument, the extended model in Equation 3.15 through Equation 3.17 may be appropriate in our context to extract the regional factor from "pure" country returns; the resulting factor loading is an unbiased estimate for regional factor. Further, the efficiency of estimates also gains from the use of value-weighted "pure" country returns relative to those estimated from individual security returns in that firm-specific risk is diversified away in a value-weighted market portfolio, which may be the major sources of the estimation inefficiency. Most important, the estimated regional factor is "pure" in the sense of Heston and Rouwenhorst (1994) that is free from the influence of other common factors.

The two-stage approach to decomposing a realized, cross-sectional market return into its industry, country and regional components will be used to examine the contribution of the regional factor to the variation in emerging market returns.

The test methodologies used to in this section are largely borrowed from Section 3.2, in which the relative importance of industry and country factors is examined in all sample markets. As regards two regression-based analyses, three model specifications will be examined. They are: An ICAPM augmented by a regionally-adjusted country factor; an ICAPM augmented by a regional factor; and an ICAPM augmented by the value-weighted industry factor, the regionally-adjusted country factor, and regional factor. Similar specification also applies to the variance equation in EGARCH (1, 1) model (see Equation 3.11).

$$[\text{Factor (s)}] \xrightarrow{defined} \text{Country Factor}$$
$$[\text{Factor (s)}] \xrightarrow{defined} \text{Reginoal Factor}$$
$$[\text{Factor (s)}] \xrightarrow{defined} \text{Indsutry Factor} + \text{Country Factor} + \text{Regional Factor}$$

Furthermore, the evolutionary roles of industry, country and regional factors in the realm of emerging markets will also be examined via the time series plots of rolling averages (medians) and standard deviations (MADs) within 36 weeks and in association with the global business cycles during the sample period of 1994-2003.

3.4 Chapter Summary

This chapter has provided details on major research methodologies to be used to extract and examine the relative importance of industry, country and regional factors in determining the market performance. Major hypotheses to be empirically tested have also been outlined therein.

Several contributions of this study to the existing literature can be summarized as follows. First of all, this study has directly addressed the issue proposed by Baca, Garbe and Weiss (2000) and Cavaglia, Brightman and Aked (2000), among others, that the conclusions regarding the relative importance of industry factor in determining the market performance are sensitive to the maturity of the markets. In this study, country grouping strategy has been used to examine the contribution industry factor to the performance of emerging markets as well as developed markets.

Second, the "pure" industry factor (in a collective form) and the country factor have been explicitly incorporated into the well-known asset pricing model—ICAPM, to examine their contribution to the variation in average market returns. Further, in a dynamic framework, in order to capture the stylized facts on volatility of high frequency returns, such as volatility clustering, fat-tailed empirical distribution, and volatility mean reversion, an Exponential GARCH model (Nelson (1991)) is investigated with explicit incorporation of two factors in its conditional variance equation.

Finally, the dummy variable regression model of Heston and Rouwenhorst (1994) has been extended into a two-stage fashion to examine the role of the regional factor in determining the emerging market performance.

CHAPTER IV

DATA AND SUMMARY STATISTICS

4.1 Introduction

The building blocks are collected from Datastream International. After a thorough assessment on each candidate dataset available on Datastream in terms of (1) the consistency of its industry classification system and (2) the availability of data history, a relatively new dataset supplied by FTSE International Limited (FTSE)—FTSE All-World Index Series$^{TM/SM}$ has been chosen.

The remainder of this chapter is organized as follows. An introduction to the FTSE All-World Index Series$^{TM/SM}$ is offered in Section 4.2. Section 4.3 details the data collected for this thesis. Some summary statistics are offered in Section 4.4. Section 4.5 concludes this chapter.

4.2 FTSE All-World Index Series$^{TM/SM}$

FTSE All-World Index Series$^{TM/SM}$ (hereafter FTSE Index)[38] was launched by FTSE International Limited (FTSE) in 1987. It consists of the original Financial Times Actuaries World Indices that was available since 1985 and the recently acquired ING Barings Emerging Markets database. Like other index products, FTSE Index chooses a representative sample of approximately 2700 stocks from its coverage of 48 major stock markets[39] worldwide to construct various indices as proxies for the market and industry performances. These indices are based on FTSE free-float procedures (see FTSE (2003) for further information). The constituent stocks represent approximately 90-95 percent of the *investible* market capitalization in each covered stock market.

FTSE Index assigns its universe of stocks into industries according to a three-level hierarchical industry classification system. As defined in FTSE Global Classification System (FTSE (2003)), the three levels are: Ten Economic Groups, 36 Industry Sectors, and 102 Industry Sub-Sectors. The yardstick for a stock to be included in an industry is judged by the staple line of business of its issuer that generates

[38] There are several other datasets available at Datastream and they are discussed in Appendix B.10.

[39] Originally, the number of constituent countries is 49. Venezuela was dropped from the monitoring country list as a result of its frequent violations of the "Ground Rules for the Management of the FTSE All-World Index," a standard used by FTSE to construct FTSE All-World Index Series$^{TM/SM}$. See Appendix B.3 for a list of constituent countries.

considerable revenue for its issuing firm. Constituent stocks within each industry are reviewed periodically and closely examined by a dedicated management group on their eligibility as representatives of their respective industries. There is a high correlation of performance among securities within their industries (FTSE (2003)). Like other well-accepted industry grouping strategy, FTSE Global Classification System evolves through time in line with the changing features of the driving forces behind the global economy. There are several revisions after its first release. As far as this thesis is concerned, the industry classification system used by FTSE to classify its universe of stocks is 2003 version.

Appendix B.1 provides a detailed breakdown of the composition of these industry groups (down to two digits). As can be seen from this appendix, during the sample period of 1994-2003, the classification at the Economic Group level is quite stable. In contrast, the classification at the Industry Sector level has experienced several changes since the first launch of FTSE Index. For example, compared to the early version, FTSE Global Classification System 2003 has dropped two Industry Sectors since December 31, 2001, i.e., "Packaging" (DS: PK[40]) in "Non-Cyclical Consumer Good" (DS: NC) Economic Group and "Distributors" (DS: DS) in "Cyclical Services" (DS: CS) Economic Group. Further, two Industry Sectors are combined into one since December 31, 2002, i.e., "Gas Distribution" (DS: GD) and "Water" (DS: WT) into "Utilities, Other" Industry Sector within "Utilities" Economic Group (DS: UT). Apart from these changes, the industry classification system is quite stable at both levels during most of the sample period. Since the sample period covered in this thesis is 1994-2003, therefore, there are ten FTSE Economic Groups and 39 FTSE Industry Sectors available for examination in this thesis.

[40] Datastream downloading mnemonics for the corresponding data series are presented in the parentheses in the following format: DS:XXXX, where DS stands for Datastream and XXXX is the downloading mnemonics.

At the market level, FTSE Index divides its constituent 48 stock markets into three groups according to several eligibility conditions,[41] i.e., Developed Stock Markets, Advanced Emerging Stock Markets, and other Emerging Stock Markets.

4.3 A Description of Collected Data

4.3.1 Selected Sample Period

The sample period covered in this thesis is from January 1, 1994[42] to June 30, 2003, amounting to a total of nine and a half years. This is a relatively volatile period for both developed and emerging stock markets. It has witnessed the worldwide bull markets during 1995-1999 and several waves of mergers and acquisitions across national borders during 1990s. Coupled with the positive outlook, this sample period has also spotted several notorious financial crises taking place in developing countries since late-1994, for example, the Argentina Peso Crises of late-1994, the Asian Financial Crisis of 1997-1998, and the Russian Debt Crisis of 1998 that has thrown a couple of developing countries in Latin America into another round of financial mess in late-2000. In developed countries, this is also a chaotic period, especially during the later half of the sample period. For example, the 9/11 Terrorists Attack of 2001 has thrown U.S. economy, as well as the world economy, into turmoil. Japan has also witnessed a decade long economic recession starting from early 1990 (Harvey and Bekaert (2002)). Therefore, outlier observations may exist in the collected data that will introduce biases into the conclusion regarding the importance of industry, country and

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[41] The eligibility conditions are (see FTSE (2003), p7) :

(i) Primary Factors
- Data quality: availability & timeliness.
- Free flow of foreign exchange.
- GDP (per capita).
- Market breadth: number of eligible constituents.
- Market depth: number of industrial sectors.
- Reliable price information.
- Stock market capitalization vs. GDP.
- Unrestricted/low restrictions on foreign investment.

(ii) Secondary Factors
- Efficient settlement systems.
- Liquidity – minimum stock market turnover.
- Market maturity.
- Membership of economic group or common currency block.
- Total stock market capitalization.

[42] This the date on which the first observation of industry index returns is available at FTSE All-World Index Series$^{TM/SM}$.

regional factors in explaining the variation in realized market returns of affected countries. As a solution, several robust measures have been proposed to explicitly cope with this issue.

4.3.2 Selected Stock Markets

Instead of using all 48 stock markets included in the FTSE Index, a subset of 33 major stock markets has been chosen. The eligibility for a market to be included in this study is based on the importance of its constituent industries in the world economy and a balanced market representation (in terms of market capitalization) in Asia, Europe, and (Latin) America. Therefore, an element of subjectivity has been introduced into the selection of the sample stock markets.

After a careful market-by-market assessment with above criteria, the following groups of stock markets have been chosen. The first group is Group of Seven (G7) countries, comprising of Canada (cCN), the United States (cUS), France (cFR), Germany (cBD), the United Kingdom (cUK), Italy (cIT), and Japan (cJP). They represent the most industrialized countries in the world. On average, they make up about 93 percent of the world market capitalization in the FTSE Index during the sample period.

Most of developed markets in G7 are from Europe[43] and North America with a total market capitalization of 70 percent of the FTSE index. As a balancing force against the possible bias of the estimated industry factor towards the developed markets of Europe and North America, another four developed countries in Asia-Australasia are also selected. They are Australia (cAU), New Zealand (cNZ), Hong Kong/China (cHK),

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[43] It would be argued by some that the international industry indices used in this study to extract the industry factor therein may possibly be biased because the industries in these omitted countries, especially these located in Europe could be important contributors to the subject industry index. This study contends that this could be a trivial case in this study because empirical studies on European stock markets have demonstrated that three European countries included in G7 group, i.e. U.K., Germany and France, dominate the European stock market in terms of their market capitalization and the number of listed stocks (for example, Drummen and Zimmermann (1992) and Heston and Rouwenhorst (1994)). These countries are widely considered as major propellants of European economy and industries within these countries are also a dominant force within their respective European industries in terms of market capitalization and number of list stocks (see Heston and Rouwenhorst (1994) and other studies with European countries as a focus). Furthermore, during the sample period, most of developed European countries have become more integrated with each other in tandem with the formation of the European Union. Hence, these three countries are used as a representative of European market.

and Singapore (cSG). They constitute about 0.4 percent of the total market capitalization of the FTSE Index. At first sight, these four markets seem trivial in terms of the contribution of their national market capitalization to FTSE Index. However, when measured in terms of the market capitalizations of industries, these four markets may become important players since some of them are dominant players in some industries as a result of natural resource endowment or a result of their key roles in the regional economy. For example, Australia plays an important role in the resources and mining industry, whereas Hong Kong/China is an important regional financial center, acting as a medium between mainland China and the world economy.

The stock markets in G7 and Asia-Australasia constitute the developed (stock) markets group, or DSMs.

As suggested in the thesis title, the focus of this study is on a comparison of industry factors in both developed and emerging markets. Therefore, along with the above eleven developed markets, a group of emerging (stock) markets (ESMs) have also been selected to fulfill the comparative nature of this study. ESMs are chosen from a universe of markets that are identified in FTSE Index as emerging markets. Within this universe of markets, two additional criteria are used for an emerging market's eligibility to be included in this study: (1) It should have a comparatively large market capitalization and relatively regulated capital market. This means that more industries may be covered in that market with a decent amount of constituent stocks, which may reduce the impact of the firm-specific risk in an industry portfolio due to the under-representation problem common to emerging markets. (2) Its domicile country should have experienced a steady economic growth during 1994-2003.[44] Armed with these criteria, along with the priority for the regional representation, 22 emerging markets are

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[44] The reasons behind these selection criteria have their empirical content. First of all, the market capitalization of most ESMs and their constituent industries are negligible when compared with those industries in developed markets. As indicated in the previous chapter, the industry market capitalization plays a key role in estimating each factor in a typical dummy variable regression model of Heston and Rouwenhorst (1994) using aggregate index returns. Therefore, market capitalization is used as one of the yardsticks. Moreover, market performance, in part, is determined by the business environment of its domicile country. If the economic performance of a country is impressive, so is its stock market. Foreign investors will consider holding some of the stocks listed in these ESMs, via which they can benefit from the economic growth of the developing countries. Through the inflow of foreign portfolio investment, these developing countries will regulate themselves to meet the international standards, which in turn pull more needed capital into their economies (Sudweeks (1989)). Therefore, as a second criterion, this thesis has chosen these ESMs located in the developing countries having experienced steady economic growth during the sample period.

chosen from FTSE Index. They are further divided into four country sub-groups. They are: (1) Advanced ESMs group,[45] which includes Brazil (cBR), Mexico (cMX), Israel (cIS), Korea (cKR), Taiwan/China (cTA), and South Africa (cSA). (2) ESMs located in Asia: India (cIN), Pakistan (cPK), China (cCI), Indonesia (cID), Malaysia (cMA), the Philippines (cPH), and Thailand (cTH). (3) ESMs located in Europe: Czech Republic (cCR), Hungary (cHG), Poland (cPL), Turkey (cTU), and Russia (cRU), among which, most of them are from Eastern European Communist Bloc. And, (4) ESMs located in Latin America: Argentina (cAG), Chile (cCH), Colombia (cCO), and Peru (cPE). All together, ESMs constitute about 2.6 percent of the market capitalization of FTSE Index. See Appendix B.3 for a list of all 33 markets used in this study and their group assignment.

This thesis's choice of stock markets contrasts to the choices of other recently published studies. Rouwenhorst (1999) and Heston and Rouwenhorst (1994) have examined a group of European countries only. Given the increasing integration of these countries in the form of European Union (EU) since early 1990s, the dummy variable regression model may produce regional instead of global industry factors. Several other studies, e.g., Roll (1992) and Griffin and Karolyi (1998), have included a couple of ESMs in their sample. Due to the segmentation of these emerging markets from world capital market during 1980s and early 1990s (Bekaert and Harvey (1995)), the use of ESMs in these studies may lead to the conclusion of the dominance of the country factor in explaining the variation in international security returns (Cavaglia, Brightman and Aked (2000); Baca, Garbe and Weiss (2000)). The sample used in this study, however, is flexible enough to examine each factor in different permutations of stock markets by grouping 33 markets into two sub-samples consisting of either all 22 emerging or all 11 developed markets only, as well as in a mixed sample. According to the official liberalization dates listed in Appendix B of Bekaert and Harvey (2000), most emerging markets have become more integrated with the world capital market during 1994-2003

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[45] Notice that Advanced ESMs group is classified by FTSE Index. This thesis decides to keep it as an independent group in this study. This choice could be justified by the fact that these advanced ESMs are not only advanced in their market regulations and market structure as documented in FTSE (2003c), but they are also advanced in their employed technologies to produce their products. Hence, it is plausible to purpose that they are more economically and financially integrated with the world economy and developed markets than other ESMs. For example, among them, South Korea has established herself as one of the world leading electronics providers and car producers. Most of challenges for her listed firms could possibly come from multinationals of developed countries in the same industries rather than those from other ESMs. Therefore, the profitability and the resulting performance of the listed stocks may be more subject to global than local or regional factors.

that used to be. Thereby, it is expected that world risk factors, such as world market and global industry factors, may play an increasingly important role in these liberalized emerging markets.

4.3.3 Selected Granularity of Industry Classification

As described in Section 4.2, FTSE Index groups its constituent stocks into a three-level industry classification system: Economic Groups, Industry Sectors, and Industry Sub-Sectors. This study uses the industry classification down to two-digit level, i.e., ten Economic Groups and 36 Industry Sectors. This choice reflects the effort to balance two offsetting concerns specific to this area of study. On the one hand, the industry indices that are constructed under a finely grained industry classification are used so that firms in unrelated businesses are not grouped together. On the other hand, if a more refined industry classification is utilized, such as 102 FTSE Industry Sub-Sectors, the estimated industry and country factors may be statistically unreliable. This unreliability comes from the fact that too few firms are covered in a given Industry Sub-Sector and the estimated industry factor will be impossible to separate the industry-specific risk from the firm-specific risk. In other words, the industry factor will be confounded with the firm-specific risk that may introduce excess volatility into the industry indices.

With two industry classification systems, the sensitivity of the estimation results can be tested against the different granularities. It is expected that the industry factor estimated under the refined industry classification system will be stronger than is under the broad one.

U.S. dollar-denominated,[46] Weekly (Wednesday-to-Wednesday) continuously compounded[47] industry returns are computed and aggregated[48] from daily total return indices[49] supplied by Datastream. For each industry, U.S. dollar-denominated market capitalization is also used for the WLS regression to extract industry, country and regional factors from industry returns.

The dataset shows that not all 36 FTSE Industry Sectors are well represented cross-sectionally in each market. Typically, in a given market, more Industry Sectors are represented at the end of the sample period than at the beginning. At FTSE Economic Group level, it is less problematic. Thanks to Heston and Rouwenhorst (1994), their dummy variable regression model is flexible enough to extract industry,

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[46] In this study, daily data series denominated in U.S. dollars have been selected for several reasons. First of all, this is a common practice in the existing literature to convert local currency returns into a numeraire currency denominated returns and then decompose each market return into its global industry and country components. It has immediate implication that all returns are viewed from the perspective of international investors rather than local investors. The second reason lies in the fact that one of key variables, i.e., market capitalization, is denominated in U.S. dollars. Unfortunately, not all countries have a complete history for foreign exchange rate during the sample period. Therefore, it is impossible for us to convert U.S. dollar-denominate market capitalization data series into its local-currency counterparts, if industry and country factors free of currency risk are intended to be examined. Even if the numeraire currency can be converted to construct currency-risk-hedged returns via excess local returns above local risk-free rates, it is impossible to obtain an appropriate risk-free rate for every country in our. By U.S. dollar-denominated returns, the currency risk is implicitly built in returns. Furthermore, all returns are denominated in U.S. dollars to negate the influence of domestic inflation. That is, these returns only contain U.S. inflation and are consistent across markets.

[47] Moore (1964) has empirically shown that there exists a dependent relationship between variance of the arithmetic returns and the price level and the transformation of price relative into a logarithmetic form tends to stabilize the variance of returns. Following the above suggestion, throughout this study, continuously compounded returns are used. Daily continuously compounded return is calculated as a log change of total return index of two consecutive trading days: $\log(TRI_t / TRI_{t-1})$, where TRI stands for total return index. Multiple-day returns, such as weekends and holidays, are included in computed return series.

[48] Weekly returns are aggregated from Wednesday-to-Wednesday closing daily log returns. If Wednesday returns are not available, Thursday returns are used instead in order to avoid well-documented calendar anomalies. Because of the nature of log returns, the formula used to obtain continuously compounded weekly returns is:

$$R_{weekly} = \sum_{t=Thurday}^{Wednesday} R_{daily,\,t} \quad ,$$

where, R_{weekly} is the weekly continuously compounded return, $R_{daily,\,t}$ is the daily continuously compounded return within a Wednesday-to-Wednesday week. Note that this method is only applicable to the continuously compounded return series (Tsay (1986), p. 10).

[49] Total return index is a closing, aggregate return index computed by Datastream, which is a sum of capital gains and dividend yields, with dividend reinvestment. It is also adjusted for the issuance of rights, splits, and stock dividends with an arbitrarily selected base date equal to 100. Total return index for each Economic Group (Industry Sector) is computed on a daily base and denominated in five currencies: Local currency, UK sterling, US dollar, Japanese yen and Euro.

country and regional factors cross-sectionally from industry returns with missing observations.

4.3.4 National Stock Market Returns

As can be seen from Chapter 3, national stock market returns are important input for the variance ratio analysis and the regression-based analysis. In order to fulfill different purposes, two kinds of market returns (continuously compounded) are used. The first one is the weekly contemporaneous market returns as computed and aggregated from the daily total return indices for each market in FTSE Index (for details, see Footnotes 47 and 48). They are used in the regression-based analysis as the dependent variable.

The second kind of market returns is reconstructed from cross-sectional industry returns in order to extract the industry, country and regional factors.[50] That is, they are reconstructed from a multiple between the weights computed by using *beginning-of-week* market capitalization for each constituent FTSE Economic Groups (Industry Sectors) in each market and their respective realized industry returns at the end of that week:

$$R_{k,t} = \sum_{j=1}^{J} \omega_{j,k,t-1} R_{j,k,t} \quad , \qquad (4.1)$$

where, $R_{k,t}$ is the return for country k at time t; $\omega_{j,k,t-1}$ is the weight for industry j in country k computed by its market capitalization at the beginning of the week; $R_{j,k,t}$ is the corresponding industry return for industry j in country k at time t; and, J is the total number of industries in a given classification system. Thereby, two market return series

[50] This reconstruction method ensures that the value-weighted market returns can be *exactly* decomposed into its industry, country and regional components. Please see Heston and Rouwenhorst (1994) for further details.

from 10 FTSE Economic Groups and 39 FTSE Industry Sectors are reconstructed.[51] They will be used in the variance ratio analysis (see Section 3.2.3 of Chapter 3) to compute the total variation in excess market returns above the world benchmark portfolio (the intercepts).

Are these two reconstructed market returns significantly different from each other? In order to address this issue, for each market, two-sample with unequal variances and paired t-tests are conducted on these two reconstructed market returns. The null hypotheses for each type of t-test are that (1) the means of the two series are not significant different from each other; and, for the paired t-test, (2) differences between two paired series are not statistically significant different from zero. The two t-test results are reported in Table 4.1.

All t-statistics (or p-values) under "Two-sample Unequal Var." are not statistically significant at conventional levels. In other words, the unconditional population means of two reconstructed market return series are almost identical to each other. In contrast, the paired t-test results, under "Paired" strongly reject the hypothesis that the *paired differences* of the two reconstructed market return series are zero. For one market, Russia, however, the difference between the two market return series is effectively both zeros. This suggests[52] that (1) inconsistencies may exist in industry returns provided in FTSE Index; and (2) despite that imperfection, the two-sample t-test results suggest that the two reconstructed market return series can be used interchangeably. Further, under "Abs. Difference," the means and medians of the absolute difference between two reconstructed market return series also suggest that the differences are not significant in the economic sense for eleven developed markets. However, for some emerging markets, such as Malaysia, the discrepancy is quite economically significant when gauged by means. Medians, on the other hand, suggest

[51] In theory, these two datasets should produce the same results regarding the market returns because the sector indices are computed from the same set of constituent companies in each market cross-sectionally. Unlike the previous studies in which a detailed list of constituent companies is available, in this study, only industry indices are available. Unfortunately, these indices could be error-prone because of some mistakes common to financial database, such as recording errors. Hence, an economic group index could be statistically different from the aggregate index computed by its value-weighted constituent industry sectors, which will, in turn, jeopardize the statistical test results without properly addressing this issue.

[52] Of course, the test results could be error-ridden, if the conventional assumptions behind the t-tests are violated, such as the normality of the difference between two series.

Table 4.1

T-tests (Two-sample and Paired) on U.S. Dollar-Denominated Market Returns Reconstructed from Two Sets of Industry Returns with Different Industry Classification Granularity

This table presents the *t*-test (two-sample with unequal variance and paired) results for the null hypothesis that the differences between national stock market indices obtained from returns on industries with different granularity are not significantly different from zeros. Along with these tests, means and medians of absolute difference between two series for each market are also reported in percentage format. In this study, national stock market indices are computed from 10 FTSE Economic Group Indices and 39 FTSE Industry Sector Indices, weighted by corresponding market capitalizations at the beginning of the synthetic week (Wednesday-to-Wednesday) in each market from January 12, 1994 to June 25, 2003. *T*-statistics and *p*-values are reported for each market. Significance at the 1% level is denoted by ***, at the 5% level by **, and at the 10% level by *.

Group	Sub-group	Country	Abs. Difference Mean (in %)	Abs. Difference Median (in %)	Two-sample Unequal Var. *T*-stat	Two-sample Unequal Var. *P*-value	Paired *T*-stat	Paired *P*-value
DSM	*G7*	Canada	0.024	0.017	0.119	0.906	15.434***	0.000
		United States	0.017	0.013	0.073	0.942	12.463***	0.000
		France	0.039	0.029	0.133	0.895	12.036***	0.000
		Germany	0.054	0.035	0.073	0.942	4.184***	0.000
		United Kingdom	0.022	0.013	0.112	0.911	11.260***	0.000
		Italy	0.013	0.009	0.039	0.969	9.837***	0.000
		Japan	0.015	0.010	0.075	0.940	14.111***	0.000
	Asia/ Australasia	Australia	0.027	0.011	0.115	0.908	4.783***	0.000
		New Zealand	0.026	0.010	0.081	0.936	3.985***	0.000
		Hong Kong/China	0.025	0.012	0.055	0.956	3.493***	0.000
		Singapore	0.040	0.019	0.076	0.940	5.944***	0.000
ESM	*Advanced*	Brazil	0.021	0.011	0.047	0.962	10.790***	0.000
		Mexico	0.116	0.023	0.011	0.991	0.159***	0.000
		Israel	0.071	0.044	0.076	0.940	3.690***	0.000
		Korea	0.058	0.035	0.040	0.968	3.695***	0.000
		Taiwan/China	0.036	0.018	0.032	0.974	3.362***	0.000
		South Africa	0.460	0.126	0.117	0.907	0.549***	0.000
	Asia	India	0.093	0.047	0.016	0.987	0.357***	0.000
		Pakistan	0.127	0.031	-0.048	0.962	-1.476***	0.000
		China	0.255	0.098	0.063	0.950	0.851***	0.000
		Indonesia	0.126	0.077	0.095	0.924	5.337***	0.000
		Malaysia	0.207	0.108	-0.056	0.956	-1.150***	0.000
		Philippines	0.018	0.008	0.029	0.977	6.087***	0.000
		Thailand	0.088	0.048	0.046	0.964	2.426***	0.000
	Europe	Czech Republic	0.109	0.000	-0.033	0.974	-0.901***	0.000
		Hungary	0.022	0.002	-0.009	0.993	-0.750***	0.000
		Poland	0.313	0.087	-0.031	0.975	-0.297***	0.000
		Turkey	0.112	0.057	0.051	0.959	3.105***	0.000
		Russia [1]	0.000	0.000	-	-	-	-
	Lat. America	Argentina	0.097	0.027	0.015	0.988	0.512***	0.000
		Chile	0.088	0.049	-0.010	0.992	-0.333***	0.000
		Colombia	0.132	0.048	0.070	0.944	1.523***	0.000
		Peru	0.197	0.067	-0.028	0.978	-0.424***	0.000

Notes: [1] *T*-statistics and *p*-values are not reported for Russia because the national market indices computed from two sets of industry return indices are exactly the same. That is, the difference is zero for each pair and standard deviation is also zero.

that outliers may exist because they are so different from means for some emerging stock markets.

As a compromise, when presenting empirical results in the variance ratio analysis, the reconstructed market returns are used to ensure that the decomposition results of Heston and Rouwenhorst (1994) are held.

4.3.5 World Market Portfolio Return, Proxy for Risk-Free Rate, and Others

The regression-based analysis on the relative importance of industry factors in each market requires the input of returns on world market portfolio and global risk-free rate. For the former one, the FTSE All-World (DS: AWWRLD$) returns are chosen as a proxy that are value-weighted index with all 48 countries covered in the FTSE Index and denominated in U.S. dollars. For the global risk-free rate, since industry/market returns are at weekly frequency and denominated in U.S. dollars, one-week Euro-dollar deposit rate (DS: ECUSD1W) is used as the proxy.

Further, "Number of Equity" (DS: NE) data series is also used to examine the distribution of securities in terms of industries and markets. Unfortunately, NE data is not available for all sample markets till July, 2002.

4.4 A Summary of Data

4.4.1 Weights Analysis

Table 4.2 provides an industrial decomposition of national market indices by ten FTSE Economic Groups[53] in terms of the time series average number of equities (NE) in each industry index during the sample period. The total number of constituent firms is 1986 on average. Most of the firms are concentrated in developed markets (DSM), which amounts to 1284 on average. In contrast, emerging markets (ESM) have only about 702 firms in total. Within each Country Group, there is also a non-uniform distribution of constituent firms. For example, for G7 sub-group, there are about 1103

[53] The industrial decomposition of national market indices by the time series average NE in 39 FTSE Industry Sectors are also reported in Appendix B.4.

firms, almost nine times of the number of the firms in the countries located in Asia/Australasia. Most firms within DSM Group are concentrated in the U.S. and Japan, with 447 and 321 firms, respectively. Within the ESM Group, the "Advanced" and "Asia" sub-groups dominate the sample with the number of firms over 200.

Table 4.2

Industrial Composition by Number of Equities for Each Sample Stock Market (January 1994 - June 2003)

This table presents industry composition by 10 FTSE Economic Groups, proxied by time series average number of equities (NE), of 33 sample stock markets from the FTSE All-World Index Series from January 12, 1994 through June 25, 2003. Note that (1) for all of DSM group and some of ESM countries (both marked by *), the NE data is not available for examination till the week begins on July 3, 2001. Hence, NE data represent the latest industry composition in those countries. (2) There seems a significant decrease of the NE measure for some ESM group countries before and during the time when DSM countries are first added to the sample on July 3, 2001 (for details, please refer to Appendix 4.5 to this Chapter for a group of time series plots for NE data for each sample stock market during the full sample period). "(Sub)-Group Sum" measures are reported for each group (sub-group) and "All Sample Countries Sum" measures are also reported for all sample stock markets.

Group	Sub-group	Country	FTSE Economic Group										All Sample Contries Sum
			Resources	Basic Industries	General Industries	Cyclical Consumer Goods	Non-Cyclical Consumer Goods	Cyclical Services	Non-Cyclical Services	Utilities	Financials	Information Technology	
DSM	G7	Canada*	16	12	5	2	6	13	6	5	16	5	86
		United States*	22	27	36	18	69	81	19	32	84	59	447
		France*	1	7	4	6	6	7	4	2	5	3	45
		Germany*	-	5	3	5	7	5	1	2	7	2	37
		United Kingdom*	7	8	5	1	17	41	7	8	29	4	127
		Italy*	2	1	4	3	2	4	4	2	18	-	40
		Japan*	6	63	53	31	39	46	7	11	42	23	321
		Sub-Group Sum	*54*	*123*	*110*	*66*	*146*	*197*	*48*	*62*	*201*	*96*	*1103*
	Asia/ Australasia	Australia*	9	5	3	-	8	15	3	1	21	-	65
		New Zealand*	-	4	-	1	2	11	1	2	3	-	24
		Hong Kong/China*	1	1	12	3	1	10	4	3	17	1	53
		Singapore*	-	1	7	1	3	7	2	-	13	5	39
		Sub-Group Sum	*10*	*11*	*22*	*5*	*14*	*43*	*10*	*6*	*54*	*6*	*181*
	Group Sum		***64***	***134***	***132***	***71***	***160***	***240***	***58***	***68***	***255***	***102***	***1284***
ESM	Advanced	Brazil*	4	6	3	-	3	-	15	5	3	-	39
		Mexico*	1	2	2	-	5	4	4	-	2	-	20
		Israel	-	6	7	2	4	2	4	-	10	3	38
		Korea	3	4	8	5	5	4	4	2	14	1	50
		Taiwan/China	-	15	13	15	2	9	3	-	28	53	138
		South Africa*	9	3	3	1	5	8	4	-	13	1	47
		Sub-Group Sum	*17*	*36*	*36*	*23*	*24*	*27*	*34*	*7*	*70*	*58*	*332*
	Asia	India	2	8	6	2	10	2	2	3	8	6	49
		Pakistan	2	7	1	2	-	1	1	4	3	-	21
		China	4	10	9	7	3	11	1	6	3	2	56
		Indonesia	-	1	-	2	6	3	2	-	4	-	18
		Malaysia	-	9	-	4	9	11	2	6	11	2	54
		Philippines	1	-	2	-	2	2	1	2	7	-	17
		Thailand	3	8	1	-	2	5	3	2	12	3	39
		Sub-Group Sum	*12*	*43*	*19*	*17*	*32*	*35*	*12*	*23*	*48*	*13*	*254*
	Europe	Czech Republic	-	1	-	-	-	1	1	1	1	-	5
		Hungary	1	1	-	-	2	-	1	1	1	-	7
		Poland	1	4	-	1	-	2	1	-	5	2	16
		Turkey	1	5	4	6	1	2	1	2	6	1	29
		Russia	4	1	-	-	-	-	-	2	1	-	8
		Sub-Group Sum	*7*	*12*	*4*	*7*	*3*	*5*	*4*	*6*	*14*	*3*	*65*
	Lat. America	Argentina	1	4	-	1	2	-	1	2	4	-	15
		Chile	1	3	2	-	5	3	2	3	4	-	23
		Colombia	-	3	-	-	1	1	-	-	3	-	8
		Peru	1	1	-	-	-	-	-	2	1	-	5
		Sub-Group Sum	*3*	*11*	*2*	*1*	*8*	*4*	*3*	*7*	*12*	*-*	*51*
	Group Sum		***39***	***102***	***61***	***48***	***67***	***71***	***53***	***43***	***144***	***74***	***702***
All Sample Countries Sum			**103**	**236**	**193**	**119**	**227**	**311**	**111**	**111**	**399**	**176**	**1986**

There is also a wide disparity in the average number of firms covered in each market. Some of the markets are widely represented, for example, the U.S. has 482 stocks and Japan, 330. At the other extreme are markets like Russia, with only 10 stocks. Most of emerging markets are under-represented, except for Malaysia, with 87 stocks on average, which is much bigger than some of the markets in DSM Group, such as Germany and Italy.

When examined in columns, i.e., the distribution of firms across ten FTSE Economic Groups, Table 4.2 demonstrates that most of firms belong to one of four Economic Groups: "Financials," "Cyclical Services," "Basic Industries," and "Non-Cyclical Consumer Goods," analogous to the distributional pattern in the study of Heston and Rouwenhorst (1994) with a focus on European countries. Among them, "Cyclical Services" and "Financials" dominate the sample, with their constituent firms being above 300, followed by "Basic Industries" and "Non-Cyclical Consumer Goods." Almost all markets have firms in "Financials," which may reflect the importance of the financial sector in a country's economy. The "Information Technology," the backbone of the new economy, also gains its importance with 176 firms on average within the sample, which is almost the same size as the traditional "General Industries."

A closer examination on the distribution of firms by industries within each Country Group/Sub-Group reveals that most firms are located in "G7" countries, followed by the "Advanced" group of emerging market countries. For example, for the service-based industries, there are only 144 firms in "Financials" in ESM Group, which is about half of the number of that in DSM Group. Within the "Cyclical Services," this phenomenon is even more pronounced with 71 firms in ESM Group, compared to 240 firms in the same industry in DSM Group. In contrast, in some traditional labor-intensive/capital-intensive industries, such as "Basic Industries" and "General Industries," the difference in average number of firms between emerging and developed markets is not that big. This evidence may reflect the fact that during the recent globalization process, most emerging market countries are major recipients of labor-intensive industries outsourced from developed countries, like textiles industry and electronic components and equipment industry. As a result, more capital is needed to be pumped into these industries via the emerging markets to sustain the economic growth, which may lead to the increasing importance of the industry factor in these emerging markets.

Unfortunately, the number of equities/firms (NE) could be a misleading indicator for industry structure in a given market for two reasons. First, not all markets have a complete history of NE data. NE data of all developed and some emerging markets was provided since the week that begins on July 3, 2001. Hence, NE data in Table 4.2 only represents the latest industry composition in these markets. Second, there is a significant decrease in NE for those emerging markets having a complete history of NE data, especially during the period when NE data of developed markets was added into the FTSE Index. To some extent, this deterioration in the coverage of firms in some emerging markets highlights two important deficiencies of the dataset. First, it may be subject to the survivorship bias. That is, only firms that have successfully survived during the sample period are eligible to be constituent securities of FTSE Index. As a result, major conclusions drawn upon such a dataset may exaggerate the performance of a given industry as well as a given market. Second, given the dominant number of firms in some developed markets, for example, the U.S. alone has 447 stocks, the estimates of global factors, i.e., the world factor, proxied by the benchmark world market portfolio return, and global industry factors, may be biased towards reflecting the economic reality in developed markets rather all 33 markets, especially in the case where ordinary linear squares (OLS) regression is used to extract each factor via the dummy variable regression model of Heston and Rouwenhorst (1994).

A different picture emerges when the industrial structure is represented by U.S. dollar-denominated market capitalization for each industry and market. Table 4.3 gives the time series average market capitalization of ten FTSE Economic Groups, expressed as a percentage of each market (reported in rows), Country Groups, as well as all 33 markets.[54] Several stylized facts arise from this table. First, the market capitalizations of G7 countries dominate the sample, composing of 92.7 percent of the total market capitalization. Among them, the U.S. is the dominant player retaining almost 53 percent of the market capitalization of 33 markets. On the other hand, though Japan has more than twice the number of firms of the U.K., yet its contribution to the total market capitalization is relatively small, with only 6 percent in difference between two countries.

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[54] A summary of time series average weights (in %) for 39 FTSE Industry Sectors for each market is also reported in Appendix B.5.

Table 4.3

Summary of Time Series Average Weights (in %) for Ten FTSE Economic Groups for Sample National Stock Markets (January 1994 - June 2003)

Summary of time series average weights (in percentage via market capitalization) for ten FTSE Economic Groups within each 33 sample countries for the full sample period, i.e. from January 5, 1994 through June 18, 2003, is reported in this table. Ten FTSE Economic Groups are classified according to FTSE Global Classification System, 2002/2003 versions as provided by Datastream International. Weekly (Wednesday-to-Wednesday) weights are calculated by using the beginning-of-the-week, U.S. dollar-denominated market capitalizations for constituent Economic Groups in each sample country. Then, time series arithmetic averages are computed for each Economic Group within the subject country, from the date when first observations are available for examination. As a consequence, the weights in each country presented in this table, in most cases, do *not* necessarily sum to one. The weights reported in "Sub-group Summary" and "All Sample Countries" rows are time series arithmetic averages obtained by averaging the sum of market capitalization of each Economic Group across its constituent countries within each country group and all sample countries, respectively.

Group	Sub-group	Country	FTSE Economic Group										Average Country Weights
			Resources	Basic Industries	General Industries	Cyclical Consumer Goods	Non-Cyclical Consumer Goods	Cyclical Services	Non-Cyclical Services	Utilities	Financials	Information Technology	
DSM	G7	Canada	29.30	11.13	8.05	0.29	11.86	10.22	3.68	3.61	9.23	12.62	2.26
		United States	8.77	6.34	10.78	4.76	19.10	14.45	9.94	6.63	12.15	7.08	52.75
		France	9.50	10.93	12.45	6.38	19.52	8.01	5.44	0.69	21.47	6.30	4.04
		Germany	-	20.13	22.64	14.12	3.16	4.05	0.30	1.33	34.28	0.92	3.80
		United Kingdom	7.79	8.59	13.57	1.05	18.60	15.05	10.38	5.97	18.96	0.04	10.92
		Italy	0.78	2.65	6.34	10.58	2.51	0.85	24.34	1.67	47.39	2.90	1.81
		Japan	1.65	12.09	7.96	13.06	6.79	10.55	2.91	6.64	32.76	5.59	17.12
		Sub-group Summary	***8.26***	***10.26***	***11.68***	***7.18***	***11.65***	***9.03***	***8.14***	***3.79***	***25.17***	***5.06***	***92.69***
	Asia/ Australasia	Australia	34.17	9.12	11.98	0.65	8.69	10.69	1.59	0.58	22.53	-	1.51
		New Zealand	3.54	38.90	-	1.47	8.65	5.96	33.46	5.64	11.56	-	0.13
		Hong Kong/China	0.28	0.50	24.65	0.93	1.04	12.02	2.09	11.00	49.30	1.14	1.62
		Singapore	-	1.94	21.03	5.44	6.08	17.77	7.67	-	39.04	1.03	0.43
		Sub-group Summary	***9.50***	***12.62***	***14.42***	***2.12***	***6.11***	***11.61***	***11.20***	***4.31***	***30.61***	***0.54***	***3.70***
ESM	Advanced	Brazil	26.26	14.54	3.89	-	2.89	2.13	26.63	13.81	9.83	-	0.38
		Mexico	3.06	16.89	15.63	-	6.48	23.20	32.48	-	5.31	-	0.48
		Israel	1.67	17.14	19.43	0.29	9.83	4.21	7.14	-	28.14	12.45	0.07
		Korea	5.29	15.84	21.93	2.87	1.72	4.81	3.00	21.54	24.71	1.80	0.29
		Taiwan/China	-	18.75	3.94	10.01	1.57	5.00	0.22	-	55.78	4.95	0.34
		South Africa	55.04	3.75	8.72	0.71	16.27	2.75	2.88	-	13.46	5.65	0.77
		Sub-group Summary	***15.22***	***14.49***	***12.26***	***2.31***	***6.46***	***7.02***	***12.06***	***5.89***	***22.87***	***4.14***	***2.32***
	Asia	India	0.82	30.87	20.45	6.46	18.72	3.16	12.61	2.01	4.90	4.38	0.10
		Pakistan	15.18	50.27	3.97	2.89	1.23	1.35	43.23	12.44	19.22	-	0.01
		China	5.38	26.40	18.93	22.62	1.50	14.19	8.45	8.97	16.37	5.99	0.03
		Indonesia	0.76	10.73	0.59	5.79	29.47	9.37	25.62	-	18.44	-	0.05
		Malaysia	-	11.21	-	10.51	15.75	25.37	5.13	6.45	25.58	0.70	0.60
		Philippines	8.21	0.96	23.77	-	13.82	2.74	10.85	12.81	35.05	-	0.03
		Thailand	3.03	16.72	3.26	-	1.49	2.34	11.92	4.56	57.17	7.09	0.08
		Sub-group Summary	***4.77***	***21.02***	***10.14***	***6.89***	***11.71***	***8.36***	***16.83***	***6.75***	***25.25***	***2.59***	***0.90***
	Europe	Czech Republic	5.47	13.50	-	-	8.29	1.90	17.31	19.41	34.12	-	0.01
		Hungary	26.24	20.67	2.44	3.16	33.58	4.29	20.18	2.51	9.61	-	0.02
		Poland	5.22	19.12	27.07	7.16	-	12.06	23.88	-	34.60	1.72	0.03
		Turkey	1.34	31.92	15.13	27.28	5.89	3.22	0.42	10.46	6.08	3.31	0.04
		Russia	34.77	3.93	-	-	-	-	-	61.31	-	-	0.05
		Sub-group Summary	***14.60***	***17.83***	***8.93***	***7.52***	***9.55***	***4.30***	***12.36***	***18.74***	***16.88***	***1.01***	***0.17***
	Lat. America	Argentina	45.48	2.90	-	3.61	6.57	-	31.69	1.39	9.76	-	0.08
		Chile	8.49	14.34	1.19	-	5.64	1.94	24.13	45.46	4.04	-	0.10
		Colombia	-	29.18	15.56	-	30.85	5.98	4.07	-	35.90	-	0.02
		Peru	6.50	9.85	-	-	21.63	-	37.75	4.79	24.27	-	0.03
		Sub-group Summary	***15.12***	***14.07***	***4.19***	***0.90***	***16.17***	***1.98***	***24.41***	***12.91***	***18.49***	-	***0.23***
All Sample Countries			***6.99***	***6.11***	***9.31***	***5.08***	***15.82***	***11.68***	***8.28***	***4.00***	***21.35***	***11.38***	***100***

In ESM Group, the emerging markets are small relative to "G7" developed markets. However, some emerging markets are larger than one might think. For example, New Zealand, though classified as a developed market, however, has a market capitalization smaller than most of "Advanced" emerging markets and some "Asia" emerging markets, for example, Malaysia. In general, the "Advanced" dominates the whole group. The dominance of "Advanced" in ESM may be attributed to the fact that compared to other emerging market countries, the "Advanced" are not only advanced in their stages of economic development, but also in their well-established capital markets that have played an important role in pumping necessary capital to those firms with internationally competitive products, such as well-known Chaebols (conglomerates of many companies) in South Korea. Among the other Country Sub-Groups in ESM Group, "Asia" has the largest market capitalization, which is about five times and four times the size of "Europe" and "Latin America," respectively. This may be evident of the important relationship between the economic development of a country and the maturity of its capital market.

Secondly, when examined on the industry-by-industry basis, "Financials" accounts for almost 20 percent of total market capitalization. It is followed by "Non-Cyclical Consumer Goods" and "Cyclical Services," with approximately 16 and 12 percent of the total market capitalization, respectively. "Information Technology," which has less number of firms than "Basic Industries," however, accounts for approximately 12 percent of total market capitalization, almost twice as large as the "Basic Industries." It may reflect investors' enthusiasm in those new industries with more growth potentials than other industries.

In summary, Tables 4.2 and 4.3 demonstrate that many of emerging markets have undiversified industrial sectors and the level of the industrial concentration is conditional on the size of their host countries' economies. Given that many of these stocks are from traditional industries, the emerging markets may have significant exposure to price fluctuations in the indices of these traditional industries.

4.4.2 Summary Statistics

Table 4.4 has summarized the performance of 33 national stock markets and FTSE All-World Market Index[55] (FTSE Market Index) during the period of January, 1994-June, 2003. All market returns are measured at weekly frequency (Wednesday-to-Wednesday) and denominated in U.S. dollars, in percentage. Unconditional, annualized

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[55] As described before, this index is treated as the proxy for world market portfolio.

sample means, standard deviations, and other primary statistics are provided in Panel A. As can be seen from this panel, not all markets have full number of observations of 494. Hungary has the least number of observations of 299. Compared across Country Sub-Groups, European emerging markets have shorter return history than other Country Sub-Groups. These results demonstrate vividly that most of European emerging markets are comparatively underdeveloped as a result of their recent transition from centrally-planned economy to market economy and the stock market, which was forbidden in the former communist regime, has assumed an increasingly important role to allocate the necessary capital for firms listed in these European emerging market countries.

There are significant differences across countries in terms of average market returns. A closer examination reveals that most of emerging markets have experienced unconditional negative average market returns during 1994-2003, ranging from -23.3 percent (the Philippines) to -0.6 percent (Mexico). Only six out of the 22 emerging markets—Israel, Korea, South Africa, China, Turkey and Peru—have positive average market returns, ranging from 0.8 percent (Turkey) to 7.3 percent (Israel). The empirical evidence stands in a direct contrast to the previous studies on emerging markets suggesting that emerging markets have higher unconditional average returns than their developed counterparts. With the up-to-date dataset used in this study, however, Panel A shows that most of emerging markets have performed poorer than expected. This evidence may conform to the hypothesis set up by Bekaert and Harvey (1995), Bekaert and Harvey (2000), Henry (2000), and Kim and Singal (2000), among others, that the more a market is liberalized and integrated with the world capital market, the lower the cost of capital in that market. It may also be the result of the tumultuous financial crises in emerging markets during the period of 1994-2003, which tend to produce negative outlier returns and intensified market volatilities. In contrast, most developed markets in the sample have positive average returns and perform better than the FTSE Market Index (5.8 percent), the proxy for the performance of the world market portfolio, ranging from 4.0 percent (New Zealand) to 9.6 percent (the U.S.). Among them, Japan, Hong Kong/China, and Singapore, however, are poor performers, with their unconditional average returns being -4.5, -3.7 and -5.6 percent, respectively.

Table 4.4

Summary Statistics for U.S. Dollar-denominated Returns on National Stock Market Indices (January 1994 - June 2003)

This table presents the summary statistics for U.S. dollar-denominated returns on the FTSE All-World National Stock Market Indices for the full sample period. Raw continuously compounded weekly returns are calculated as log changes of Wednesday-to-Wednesday closing total return indices (including both capital gain and dividend yield as provided by Datastream International) from January 5, 1994 (the first Wednesday available in the sample period) to June 25, 2003 (494 observations). The sample comprises 33 major stock markets from both developed and developing countries. Sample countries are grouped firstly according to the stages of their economic development, then, according to their geological locations. Among the groups, Advanced Emerging Stock Markets (ESMs) group is classified by FTSE.

In Panel A, primary statistics are reported. Annualized mean and standard deviations of raw returns are reported and group averages are computed as the simple arithmetic averages across all countries within the group. Maximum (minimum) return is the one-week return in percentage within the full sample period and maximum (minimum) week is the entry number for the week in which maximum (minimum) return is obtained since the beginning of the sample period. LQ(k) [LQ^2(k)] is the Box-Ljung Portmanteau test for autocorrelations up to *k*th lag for raw (squared) returns. Cross-sectional Herfindahl Concentration Indices (HCIs) are obtained by using the beginning-of-week market capitalizations for economic groups/industry sectors as classified by FTSE Global Classification System 2002/2003 within the sample country. The reported HCI for a given national stock market in this table is the simple time-series arithmetic average. The HCI would be 100 if a local market were concentrated in one economic group/industry group; its minimum value would be 1/10 (1/36), if every economic group (industry sector) were the same in size as measured by their respective aggregate market capitalizations within the sample country. SMPL is the proxy for the world return index computed by capital-weighting sample countries surveyed in this dissertation. FTSE is the market capitalization-weighted world return proxy calculated across all sampled countries within FTSE All-World Index by FTSE International (Datastream downloading mnemonic: WIWRLD$).

In Panel B, optimal lags selected by Akaike Information Criterion (AIC) and Schwartz Bayesian Information Criterion (BIC) are reported at the maximum lags of 6, 12, and 52, respectively. Correspondent *t*-statistics and *p*-values for the optimal lags are also reported.

In Panel C, distributional tests are reported for both normal distribution and an alternative fat-tailed *t*-distribution with degree of freedom of 1, 2, 3, 4, 5, 10, 15, 20, and 25. For *t*-distribution, the smaller is the degree of freedom, the fatter is the tail. Empirically, *t*-distribution with 25 degrees of freedom is approximately normally distributed.

Significance at the 1% level is denoted by ***, at the 5% level by **, and at the 10% level by *.

Panel A: Primary Statistics

Group	Sub-groups	Country	Number of Weekly Returns	Mean [1] (Annualized)	Standard Deviation [1] (Annualized)	Maximum (In one week)	Maximum Week	Minimum (In one week)	Minimum Week	Autocorrelation 1	2	3	4	5	6	LQ(6)	LQ(12)	LQ2(6)	LQ2(12)	Avg. Number of Constituent Companies [2]	Herfindahl Concentration Index: Economic Group	Herfindahl Concentration Index: Industry Sector
DSM	G7	Canada	494	8.19	18.32	8.95	458	-10.87	372	0.035	0.026	0.045	0.037	0.055	0.077	7.14	9.92	27.80***	59.77***	90	16.63	9.39
		United States	494	9.58	17.57	10.16	458	-9.13	243	-0.095	0.016	0.022	-0.015	0.015	0.045	6.11	25.23**	52.77***	98.36***	482	14.04	5.65
		France	494	7.30	21.46	13.47	458	-14.49	446	-0.191	0.056	0.075	-0.078	-0.013	0.007	25.75***	38.48***	134.83***	208.31***	48	13.04	6.23
		Germany	494	4.41	23.29	13.95	458	-13.17	401	-0.101	0.070	0.026	-0.085	-0.016	0.019	11.83*	16.73	100.07***	144.49***	38	19.98	11.49
		United Kingdom	494	6.40	16.72	10.79	447	-9.76	446	-0.175	0.047	0.052	-0.106	0.021	0.030	23.91***	28.27***	94.02***	126.27***	136	16.50	7.88
		Italy	494	8.96	24.87	10.85	158	-13.12	225	-0.039	0.031	0.084	-0.061	-0.068	-0.028	9.36	13.06	9.53	15.76	41	27.56	16.40
		Japan	494	-4.50	21.99	10.67	211	-9.57	207	-0.077	0.046	-0.013	-0.011	0.069	0.026	6.86	8.26	33.87***	42.20***	330	14.00	6.70
		Group Average		***5.76***	***20.60***																***17.39***	***9.10***
	Asia/ Australasia	Australia	494	7.55	16.93	6.72	65	-9.01	199	-0.004	0.038	-0.016	-0.051	-0.065	-0.065	6.43	8.56	13.82**	16.18	64	25.95	14.70
		New Zealand	494	4.05	20.54	8.43	259	-12.27	199	0.037	0.026	-0.014	0.043	-0.090	-0.031	6.57	15.42	9.51	29.18***	22	27.58	23.55
		Hong Kong/China	494	-3.68	27.36	13.16	249	-16.61	198	0.028	0.069	0.091	-0.092	0.055	-0.026	13.03**	20.77*	37.96***	68.24***	50	28.03	19.38
		Singapore	494	-5.60	29.04	16.53	213	-16.34	231	0.080	0.049	0.079	-0.082	0.081	-0.015	14.23**	19.32*	105.89***	166.09***	39	30.34	16.73
		Group Average		***0.58***	***23.47***																***27.98***	***18.59***
ESM	Advanced	Brazil	452	-1.33	44.39	22.46	270	-31.38	61	-0.130	0.148	-0.042	0.057	0.033	-0.022	20.73***	28.16***	59.61***	101.68***	41	22.16	18.53
		Mexico	494	-0.62	36.84	19.93	64	-22.07	50	0.066	0.056	0.053	-0.050	0.067	-0.028	8.99	15.30	85.92***	129.06***	18	22.18	18.16
		Israel	494	7.36	25.61	12.31	490	-12.09	248	-0.035	0.053	-0.042	-0.008	-0.004	0.030	3.36	7.87	10.66*	17.90	31	23.45	16.66
		Korea	494	1.80	44.01	21.08	257	-40.72	207	-0.059	0.100	0.100	-0.011	0.032	0.005	12.32*	23.09**	78.85***	139.71***	30	22.93	17.61
		Taiwan/China	494	-5.76	31.63	15.53	118	-15.53	354	0.030	0.015	0.009	-0.005	0.044	-0.064	3.66	12.50	111.45***	147.18***	45	36.18	22.41
		South Africa	494	4.38	25.69	10.71	16	-19.46	199	0.052	0.091	0.003	-0.037	0.042	0.070	9.52	15.41	11.94*	24.35**	47	29.59	28.33
		Group Average		***0.97***	***34.70***																***26.08***	***20.28***
	Asia	India	494	-4.39	27.84	15.59	165	-13.76	330	0.022	0.072	-0.087	-0.001	-0.065	-0.046	9.84	15.90	25.93***	40.90***	35	17.55	10.55
		Pakistan	494	-3.23	38.53	19.80	270	-22.97	257	0.132	0.085	0.021	-0.071	-0.104	-0.025	20.79***	25.72**	44.57***	63.73***	14	26.41	24.57
		China	494	3.40	36.16	20.31	272	-21.34	238	0.020	0.099	0.042	0.053	-0.057	0.052	10.37	13.57	114.03***	119.45***	26	19.93	16.05
		Indonesia	365	-17.11	57.83	28.86	250	-38.57	209	0.018	0.055	0.096	0.026	0.035	0.085	8.07	16.96	86.58***	125.76***	21	25.68	20.61
		Malaysia	494	-9.01	36.03	28.95	244	-23.90	209	0.081	-0.042	0.131	0.014	0.046	0.080	17.14***	36.19***	124.92***	225.87***	87	19.50	14.69
		Philippines	365	-23.28	37.16	26.02	368	-21.40	206	-0.029	0.142	0.163	-0.060	0.024	0.045	19.89***	22.16**	17.71***	40.29***	19	23.51	16.23
		Thailand	452	-18.81	51.08	30.36	278	-21.55	238	-0.023	0.121	0.129	-0.097	0.074	0.086	24.92***	35.46***	125.66***	229.91***	33	33.38	24.59
		Group Average		***-10.35***	***40.66***																***23.71***	***18.18***
	Europe	Czech Republic	365	-4.05	29.61	12.03	444	-12.39	378	-0.031	0.088	0.153	-0.097	0.040	0.010	16.00**	23.55**	5.82	10.48	14	27.10	28.73
		Hungary	299	-2.08	32.76	18.64	252	-14.00	446	0.017	0.109	0.114	-0.017	-0.004	-0.058	8.82	22.61**	37.96***	66.05***	13	23.41	23.19
		Poland	494	-5.69	38.66	26.43	27	-29.24	14	0.112	0.056	0.041	-0.096	-0.003	-0.072	15.88**	22.84**	62.53***	175.43***	28	28.59	20.85
		Turkey	494	0.80	60.33	23.69	382	-34.43	16	0.003	0.030	0.099	-0.018	0.059	-0.008	7.23	19.10*	55.59***	99.43***	29	28.09	21.28
		Russia	313	-0.86	66.60	41.40	236	-29.17	240	0.029	0.044	0.112	-0.043	0.095	0.064	9.67	14.35	106.16***	174.33***	10	56.85	56.85
		Group Average		***-2.38***	***45.59***																***32.81***	***30.18***
	Lat. America	Argentina	494	-6.94	39.95	23.77	62	-27.88	419	0.010	0.075	-0.042	-0.077	-0.049	0.037	8.53	18.73*	61.74***	67.95***	19	31.31	30.13
		Chile	494	-1.55	24.24	11.50	264	-12.42	277	0.015	0.126	0.027	0.024	-0.034	-0.028	9.61	28.84***	16.73**	34.58***	22	23.21	22.80
		Colombia	494	-2.88	29.68	20.93	158	-19.12	243	0.187	0.085	0.102	0.058	-0.025	-0.025	28.41***	43.79***	33.47***	95.92***	12	31.35	22.75
		Peru	494	6.31	29.39	18.52	66	-19.68	53	-0.019	0.077	0.059	0.076	-0.007	0.023	8.05	18.04	58.86***	83.39***	12	38.01	42.51
		Group Average		***-1.27***	***30.82***																***30.97***	***29.55***
FTSE All-World Market Index			494	5.75	15.33	9.15	458	-8.19	446	-0.075	0.058	0.050	-0.059	0.013	0.024	7.87	21.80**	78.91***	147.51***	-	-	-

Panel B: Optimal Lags (AR Model) Selected by Schwartz Bayesian (BIC) and Akaike (AIC) Information Criteria

Group	Sub-group	Country	6						12						52					
			BIC			AIC			BIC			AIC			BIC			AIC		
			Optimal Lag	*T*-stat	*P*-value	Optimal Lag	*T*-stat	*P*-value	Optimal Lag	*T*-stat	*P*-value	Optimal Lag	*T*-stat	*P*-value	Optimal Lag	*T*-stat	*P*-value	Optimal Lag	*T*-stat	*P*-value
D S M	G7	Canada	1	0.835	0.404	1	0.835	0.404	1	0.984	0.326	1	0.984	0.326	1	1.092	0.275	1	1.092	0.275
		United States	1	-2.109**	0.035	1	-2.109**	0.035	1	-2.089**	0.037	11	2.040**	0.042	1	-1.916*	0.056	11	1.930*	0.054
		France	1	-4.302***	0.000	3	2.066**	0.039	1	-4.283***	0.000	3	2.048**	0.041	1	-4.120***	0.000	1	-4.120***	0.000
		Germany	1	-2.289**	0.022	1	-2.289**	0.022	1	-2.114**	0.035	2	1.451	0.147	1	-2.062**	0.040	1	-2.062**	0.040
		United Kingdom	1	-3.940***	0.000	1	-3.940***	0.000	1	-3.913***	0.000	4	-2.061**	0.040	1	-3.737***	0.000	1	-3.737***	0.000
		Italy	1	-0.871	0.384	3	1.923*	0.055	1	-0.900	0.369	3	1.941*	0.053	1	-0.605	0.546	5	-1.749*	0.081
		Japan	1	-1.781*	0.076	1	-1.781*	0.076	1	-1.610	0.108	1	-1.610	0.108	1	-1.572	0.117	1	-1.572	0.117
	Asia/ Australasia	Australia	1	-0.087	0.931	1	-0.087	0.931	1	0.021	0.983	1	0.021	0.983	1	0.162	0.872	1	0.162	0.872
		New Zealand	1	0.806	0.421	1	0.806	0.421	1	0.654	0.514	1	0.654	0.514	1	0.891	0.373	1	0.891	0.373
		Hong Kong/China	1	0.874	0.383	3	1.954*	0.051	1	1.009	0.314	4	-2.368**	0.018	1	1.107	0.269	4	-2.052**	0.041
		Singapore	1	1.877*	0.061	1	1.877*	0.061	1	1.918*	0.056	5	1.910*	0.057	1	1.944*	0.053	5	1.917*	0.056
E S M	Advanced	Brazil	2	2.836***	0.005	2	2.836***	0.005	2	2.888***	0.004	2	2.888***	0.004	2	2.574**	0.010	2	2.574**	0.010
		Mexico	1	1.451	0.147	1	1.451	0.147	1	1.462	0.144	1	1.462	0.144	1	0.374	0.709	1	0.374	0.709
		Israel	1	-0.791	0.430	1	-0.791	0.430	1	-0.904	0.366	1	-0.904	0.366	1	-1.126	0.261	1	-1.126	0.261
		Korea	1	-1.325	0.186	3	2.494**	0.013	1	-1.241	0.215	3	2.313**	0.021	1	-1.354	0.176	3	2.204**	0.028
		Taiwan/China	1	0.615	0.539	1	0.615	0.539	1	0.623	0.534	1	0.623	0.534	1	0.639	0.523	1	0.639	0.523
		South Africa	1	1.089	0.277	2	1.967**	0.050	1	0.927	0.355	2	2.268**	0.024	2	2.589***	0.010	2	2.589***	0.010
	Asia	India	1	0.646	0.518	3	-2.013**	0.045	1	0.721	0.472	3	-2.003**	0.046	1	0.756	0.450	3	-1.979**	0.048
		Pakistan	1	2.995***	0.003	2	1.612	0.108	1	2.969***	0.003	5	-2.002**	0.046	1	3.005***	0.003	5	-1.805*	0.072
		China	1	0.369	0.712	2	2.146**	0.032	1	0.298	0.766	2	1.956*	0.051	1	-0.037	0.970	2	1.794*	0.073
		Indonesia	1	0.340	0.734	3	1.794*	0.074	1	0.366	0.715	3	1.729*	0.085	1	0.359	0.720	1	0.359	0.720
		Malaysia	1	1.859*	0.064	3	3.122***	0.002	3	3.480***	0.001	10	-3.039***	0.003	3	3.573***	0.000	12	-2.004**	0.046
		Philippines	3	3.349***	0.001	3	3.349***	0.001	3	3.291***	0.001	3	3.291***	0.001	3	2.682***	0.008	3	2.682***	0.008
		Thailand	3	2.911***	0.004	3	2.911***	0.004	3	2.852***	0.005	6	2.180**	0.030	3	2.726***	0.007	6	1.930*	0.054
	Europe	Czech Republic	3	3.063***	0.002	3	3.063***	0.002	3	3.011***	0.003	4	-1.827*	0.069	1	-0.347	0.729	4	-1.934*	0.054
		Hungary	1	0.275	0.783	3	1.927*	0.055	1	0.424	0.672	3	2.370**	0.018	1	-0.338	0.736	1	-0.338	0.736
		Poland	1	2.409**	0.016	1	2.409**	0.016	1	2.679***	0.008	4	-2.287**	0.023	1	1.481	0.139	2	1.971**	0.049
		Turkey	1	0.281	0.779	3	2.186**	0.029	1	0.213	0.831	1	0.213	0.831	1	0.122	0.903	3	2.167**	0.031
		Russia	1	0.551	0.582	3	1.930*	0.055	1	0.573	0.567	3	1.923*	0.055	1	0.455	0.649	15	-2.450**	0.015
	Lat. America	Argentina	1	0.246	0.806	2	1.651*	0.099	1	0.378	0.705	1	0.378	0.705	1	0.521	0.602	10	2.368**	0.018
		Chile	2	2.787***	0.006	2	2.787***	0.006	2	2.786***	0.006	7	-3.049***	0.002	2	2.565**	0.011	7	-3.144***	0.002
		Colombia	1	4.157***	0.000	3	1.771*	0.077	1	4.153***	0.000	1	4.153***	0.000	1	4.564***	0.000	1	4.564***	0.000
		Peru	1	-0.445	0.657	2	1.681*	0.093	1	-0.731	0.465	4	1.582	0.114	1	-0.127	0.899	1	-0.127	0.899
FTSE All-World Market Index			1	-1.667*	0.096	1	-1.667*	0.096	1	-1.591	0.112	1	-1.591	0.112	1	-1.428	0.154	1	-1.428	0.154

Maximum Number Lags: 6, 12, 52

Panel C: Distributional Tests

Group	Sub-group	Country	Skewness	Excess Kurtosis	Normal Distribution: GMM_HAC $\chi2$ [3]	Normal Distribution: Jarque-Bera	Normal Distribution: Kolmogorov-Smirnov (D)	Normal Distribution: Shapiro-Wilk (W)	T-Distribution: GMM_HAC $\chi2$ [4]	T-Distribution: DOF [5]	KS (D) [6]: 1	2	3	4	5	10	15	20	25
DSM	G7	Canada	-0.36	1.34	7.12**	47.40***	0.062***	0.981***	8.22**	16	0.474	0.472	0.471	0.470	0.470	0.469	0.469	0.469	0.469
		United States	-0.14	1.54	11.81***	50.43***	0.056***	0.981***	12.32***	14	0.472	0.470	0.468	0.468	0.468	0.467	0.467	0.467	0.467
		France	-0.23	3.14	9.75***	207.36***	0.056***	0.963***	15.95***	11	0.468	0.466	0.465	0.464	0.464	0.463	0.463	0.463	0.463
		Germany	-0.48	2.88	19.42***	189.01***	0.073***	0.957***	27.35***	10	0.470	0.467	0.466	0.465	0.465	0.464	0.464	0.464	0.464
		United Kingdom	-0.03	2.51	9.75***	129.62***	0.042**	0.974***	15.34***	13	0.476	0.474	0.473	0.473	0.473	0.472	0.472	0.472	0.472
		Italy	-0.18	0.80	6.16**	15.94***	0.037	0.992***	5.32	22	0.467	0.463	0.462	0.461	0.461	0.460	0.460	0.460	0.459
		Japan	0.43	1.07	13.13***	38.50***	0.047**	0.983***	14.38***	18	0.470	0.467	0.466	0.465	0.465	0.464	0.464	0.464	0.464
		Group Average	***-0.14***	***1.90***															
	Asia/ Australasia	Australia	-0.34	0.58	5.22*	16.42***	0.030	0.992***	6.97*	32	0.479	0.476	0.475	0.475	0.475	0.474	0.474	0.474	0.473
		New Zealand	-0.47	1.46	6.65**	62.33***	0.055***	0.980***	9.79**	15	0.473	0.470	0.469	0.468	0.468	0.467	0.467	0.467	0.467
		Hong Kong/China	-0.44	1.79	9.91***	81.91***	0.051***	0.978***	13.04***	14	0.464	0.461	0.459	0.459	0.458	0.457	0.457	0.457	0.457
		Singapore	0.02	2.55	22.36***	134.06***	0.072***	0.964***	17.30***	10	0.457	0.453	0.451	0.451	0.450	0.449	0.449	0.449	0.448
		Group Average	***-0.31***	***1.59***															
ESM	Advanced	Brazil	-0.84	4.38	16.33***	413.33***	0.089***	0.932***	18.91***	9	0.442	0.437	0.435	0.434	0.434	0.433	0.432	0.432	0.432
		Mexico	-0.23	2.39	20.79***	122.13***	0.063***	0.967***	18.70***	10	0.449	0.445	0.443	0.442	0.441	0.440	0.439	0.439	0.439
		Israel	-0.34	0.81	12.23***	23.08***	0.052***	0.985***	11.38***	21	0.468	0.465	0.464	0.463	0.463	0.462	0.462	0.462	0.462
		Korea	-0.48	4.44	5.65*	424.73***	0.047**	0.963***	7.64*	13	0.446	0.442	0.440	0.439	0.438	0.437	0.437	0.436	0.436
		Taiwan/China	0.03	0.88	8.00**	15.98***	0.059***	0.990***	5.50	20	0.458	0.454	0.452	0.452	0.451	0.450	0.450	0.450	0.450
		South Africa	-0.79	3.05	4.88*	242.79***	0.082***	0.957***	11.70***	11	0.469	0.465	0.464	0.463	0.463	0.462	0.462	0.461	0.461
		Group Average	***-0.44***	***2.66***															
	Asia	India	0.03	1.02	5.80*	21.47***	0.031	0.992***	6.99*	21	0.463	0.460	0.458	0.458	0.457	0.456	0.456	0.456	0.456
		Pakistan	-0.39	2.15	16.48***	107.38***	0.054***	0.972***	21.45***	12	0.449	0.445	0.443	0.442	0.442	0.440	0.440	0.440	0.440
		China	0.07	3.23	35.34***	215.73***	0.089***	0.947***	18.70***	8	0.448	0.443	0.441	0.440	0.440	0.439	0.438	0.438	0.438
		Indonesia	-0.45	3.49	18.87***	198.11***	0.107***	0.941***	19.01***	8	0.425	0.419	0.417	0.416	0.416	0.414	0.414	0.414	0.414
		Malaysia	0.20	7.57	33.50***	1183.39***	0.103***	0.890***	26.00***	7	0.452	0.448	0.446	0.445	0.444	0.443	0.443	0.443	0.443
		Philippines	0.19	4.12	14.82***	260.66***	0.082***	0.945***	18.35***	9	0.453	0.449	0.448	0.447	0.446	0.445	0.445	0.445	0.445
		Thailand	0.36	2.09	16.12***	92.14***	0.064***	0.970***	16.06***	12	0.436	0.430	0.428	0.427	0.426	0.424	0.424	0.423	0.423
		Group Average	***0.00***	***3.38***															
	Europe	Czech Republic	-0.25	0.40	5.83*	6.34***	0.052**	0.992**	4.95	40	0.463	0.460	0.458	0.457	0.457	0.456	0.456	0.455	0.455
		Hungary	-0.33	1.35	15.92***	27.91***	0.071***	0.975***	9.46**	16	0.462	0.458	0.457	0.456	0.455	0.454	0.454	0.454	0.454
		Poland	-0.41	3.97	5.91*	338.45***	0.064***	0.955***	11.96***	10	0.452	0.447	0.445	0.444	0.444	0.442	0.442	0.442	0.442
		Turkey	-0.46	1.49	8.36**	62.52***	0.057***	0.978***	10.47**	15	0.426	0.421	0.418	0.417	0.416	0.415	0.414	0.414	0.414
		Russia	-0.02	2.66	28.22***	92.34***	0.102***	0.950***	11.23**	9	0.421	0.414	0.411	0.410	0.409	0.407	0.406	0.406	0.406
		Group Average	***-0.29***	***1.97***															
	Lat. America	Argentina	-0.21	3.14	10.20***	206.25***	0.072***	0.963***	15.09***	10	0.446	0.441	0.439	0.438	0.437	0.436	0.436	0.436	0.435
		Chile	-0.14	1.32	13.63***	37.60***	0.048***	0.985***	10.35**	15	0.466	0.463	0.461	0.460	0.460	0.459	0.459	0.459	0.459
		Colombia	0.30	3.82	12.98***	307.68***	0.088***	0.941***	16.84***	8	0.456	0.453	0.452	0.451	0.451	0.450	0.449	0.449	0.449
		Peru	-0.04	2.99	9.22***	183.79***	0.072***	0.965***	14.09***	10	0.459	0.455	0.453	0.453	0.452	0.451	0.451	0.451	0.451
		Group Average	***-0.02***	***2.82***															
FTSE All-World Market Index			-0.15	1.64	9.86***	57.29***	0.052***	0.982***	12.26***	14	0.476	0.474	0.473	0.473	0.472	0.472	0.472	0.471	0.471

Notes:

[1] Means and Standard Deviations are annualized as follows: for Means, Average Weekly Return x 52; for Standard Deviations, Weekly Standard Deviation x (52)½.

[2] Number of Equities data series for some national stock markets within the sample are not available till March 7, 2001. They are G7 countries, Asian/Australasian DSMs, and Brazil, Mexico and South Africa in the ESM group.

[3] Heteroscedasticity-autocorrelation corrected (HAC) GMM test up to the lag of 4, as reported in Panel B using Schwartz Bayesian Information Criterion (BIC). Newey-West consistent standard deviations are used. WinRATS program is provided as an appendix to this chapter.

[4] The test series is demeaned and normalized by sample mean and standard deviation, respectively, thus, moments of the centered *t*-distribution are used to do this HAC-GMM tests. Maximum number of lags is the same as in normality tests.

[5] The degree of freedom is the by-product of the GMM test on *t*-distribution of using the simplex method for the simulated centered *t*-distribution is obtained from GMM tests as described in note 4.

[6] Almost all D-statistics reported in this column group are significant at 5% level, which strongly reject the null hypothesis that the national stock market index for the subject country is from a *t*-distribution with the given degree of freedom. A series of tests with freedom from 1 to 25 have been implemented on the data and the results are the same as presented in this section. Empirically, a *t*-distribution with a degree of freedom of 25 is approximately normally distributed.

Large differences in volatilities of U.S. dollar-denominated market returns also exist during the sample period. On average, emerging market returns are characterized by high unconditional volatilities, measured as standard deviations (annualized), ranging from 24 percent (Chile) to 67 percent (Russia). There are four emerging markets with its volatility more than 50 percent (Indonesia, Thailand, Turkey, and Russia). In addition, two countries have their market volatilities greater than 40 percent (Brazil and Korea). In conjunction with the empirical evidence from the unconditional average market returns, Panel A shows that most of the poor-performing emerging markets (with negative average returns) are associated with higher volatilities. Iinterestingly, most of them are located in Asia and Europe that have experienced financial crises recently. Thereby, a regional pattern looms among those emerging markets residing in Asia and Europe, which may be largely either due to the contagion effect of recent financial crises or due to the their increased intra-regional economic tie. Hence, an investigation along the geographic assignment may provide some insights into emerging market performance, which will be discussed in Chapter 6.

Both the range and the magnitude of the volatilities of emerging markets are much greater than found in the developed markets whose volatilities are normally less than 30 percent, ranging from 17.6 percent (U.K.) to 29.0 percent (Singapore). All 33 markets have their volatilities above the world market portfolio (15.3 percent), suggestive of the potential risk reduction in an internationally diversified portfolio.

The extreme observations during the sample period are also fascinating as a gauge of market volatility. Appealing results emerge when examining the one-week maximum/minimum returns for each market and the week within which maximum/minimum returns are achieved. Across all 33 markets, the largest positive one-week return for a given market is 40.4 percent (Russia), whereas the largest negative is -40.7 (Korea). Thirteen out of the 33 markets have one-week negative returns less than -20 percent and 12 out of the 33 markets have one-week positive returns in excess of +20 percent. With a closer look, four G7 countries have achieved their maximum returns in the same week (Week 458), which is about early October 2002, just about one year after the notorious 9/11 Terrorists Attack. For several markets located in Asia/Australasia, for instance, Australia, New Zealand, Hong Kong/China, Singapore in DSM Group and Indonesia and Malaysia in ESM Group, the poorest performance week is between Week 199 (early October 1997) and Week 231 (late May

1998), which is the period when these markets were devoured by the Asian Financial Crisis of 1997 (see Bekaert and Harvey (2003), p. 33). Further evidence also comes from the week in which Russia has achieved the minimum return. The month including Week 240 (around August 1998) is widely believed as the month in which the default crises in the Russian financial system reached its climax.[56] Interestingly, none of the Latin American countries[57] have any of their minimum return weeks during these periods. This empirical result provides weak support for the belief that there appears a regional pattern among sample countries, at least during the crisis period and for a couple of emerging markets (see Bae, Karolyi and Stulz (2003); Bekaert, Harvey and Lundblad (2003)). Further, recent financial crises in emerging markets are regionally contagion at first and then are propagated at inter-regional level.

There is a cumulative evidence suggesting that short-horizon portfolio returns (see Harvey (1995) for emerging markets evidence) and its volatility (e.g. Bollerslev (1987); King, Sentana and Wadhwani (1994)) move over time in association with its own lags.[58] In order to address this issue, autocorrelations up to six lags are reported for market returns in Panel A of Table 4.4. Besides, a series of Box-Ljung Portmanteau tests for the lag up to six and the lag up to twelve for market returns and squared market returns (for well-documented GARCH effects) are also reported. For the realized market returns, a test of the number of lags up to six reveals that five (i.e., France, Germany, the U.K., Hong Kong/China and Singapore) out of the 11 developed markets have significant autocorrelation within six lags. Among them, France and the U.K. are significant at 1 percent level. Meanwhile, Germany is only marginally significant at 10 percent level. In ESM Group, there are nine (i.e., Brazil, Pakistan, Malaysia, the Philippines, Thailand, and Colombia) out of the 22 emerging markets having significant autocorrelation within 6 lags. Most of them are quite significant at 1 percent level. It is a surprise to see that most of the countries with significant lag up to six (both in the DSM

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[56] Professor Campbell HARVEY from Duke University has provided a detailed chronology of important financial, economic, and political events in emerging markets. For interested readers, please visit the following link for further information: http://www.duke.edu/~charvey/Country_risk/couindex.htm.

[57] As another proof, the Mexican crisis of December 1994, i.e., Week 50, followed by Peru and Brazil whose worst returns appear in Week 52 and Week 61, respectively, does not appear to have any effect in other Latin American and Asian/European markets.

[58] As argued by Harvey (1995), the serial correlation for emerging markets could be symptomatic of thin trading (Fisher (1966); Hawawini (1980)) and slow adjustment to current information, which, as evident by Bhattacharya, Daouk, Jorgenson and Kehr (2000), could be the fact that emerging market returns are less responsive to firm-specific new announcement than developed market returns.

and ESM Groups) are concentrated in Asia and Latin America, indicative of the predictability of market returns in these emerging markets (Harvey (1995)).

In a similar test but with twelve lags, the testing results have corroborated the Box-Ljung tests with six lags except for Germany. Three markets, i.e., the U.S., Hungary and Chile, have exhibited significant (at above 5 percent level) autocorrelation effect within twelve lags. For the squared market returns, both Box-Ljung portmanteau tests with various maximum lags suggest that almost all markets in the sample have significant ARCH/GARCH effects except for Italy and Czech Republic.

Average Herfindahl concentration indices (HCI) for each market are also reported for different granularity of industry classification (ten FTSE Economic Groups versus 39 FTSE Industry Sectors) in the last two columns of Panel A. On average, G7 countries are less industrially concentrated than other sub-groups of countries. The highest average HCI (32.8/30.1) appears in "Europe," in which most of its member countries are transition economies. Among them, Russia has the highest HCI of 56.9. This is corroborated with the distribution of firms and market capitalization by industry in Russian market (see Tables 4.2 and 4.3), which shows that Russia is heavily concentrated in "Resources" (in number of firms) and "Utilities" (in terms of market capitalization). "Latin America" comes with the second highest HCI of 31.0/29.6, and followed by the "Advanced" (26.1/20.3) and "Asia" (23.7/18.2). For "Advanced," the highest HCIs are associated with Taiwan/China and South Africa, which are concentrated in "Financials" and "Resources," respectively. Similar picture also emerges in "Asia/Australasia" developed markets. They own relatively higher HCIs compared to G7 countries with only one exception—Italy. The fact presented in HCIs suggests that the industry composition of a given market may have somehow impact on market performance.

To complement the summary statistics in Panel A of Table 4.4, Figure 4.1 provides a plot of average returns against standard deviations for all 33 markets surveyed in this study. There are a number of interesting features with Figure 4.1.

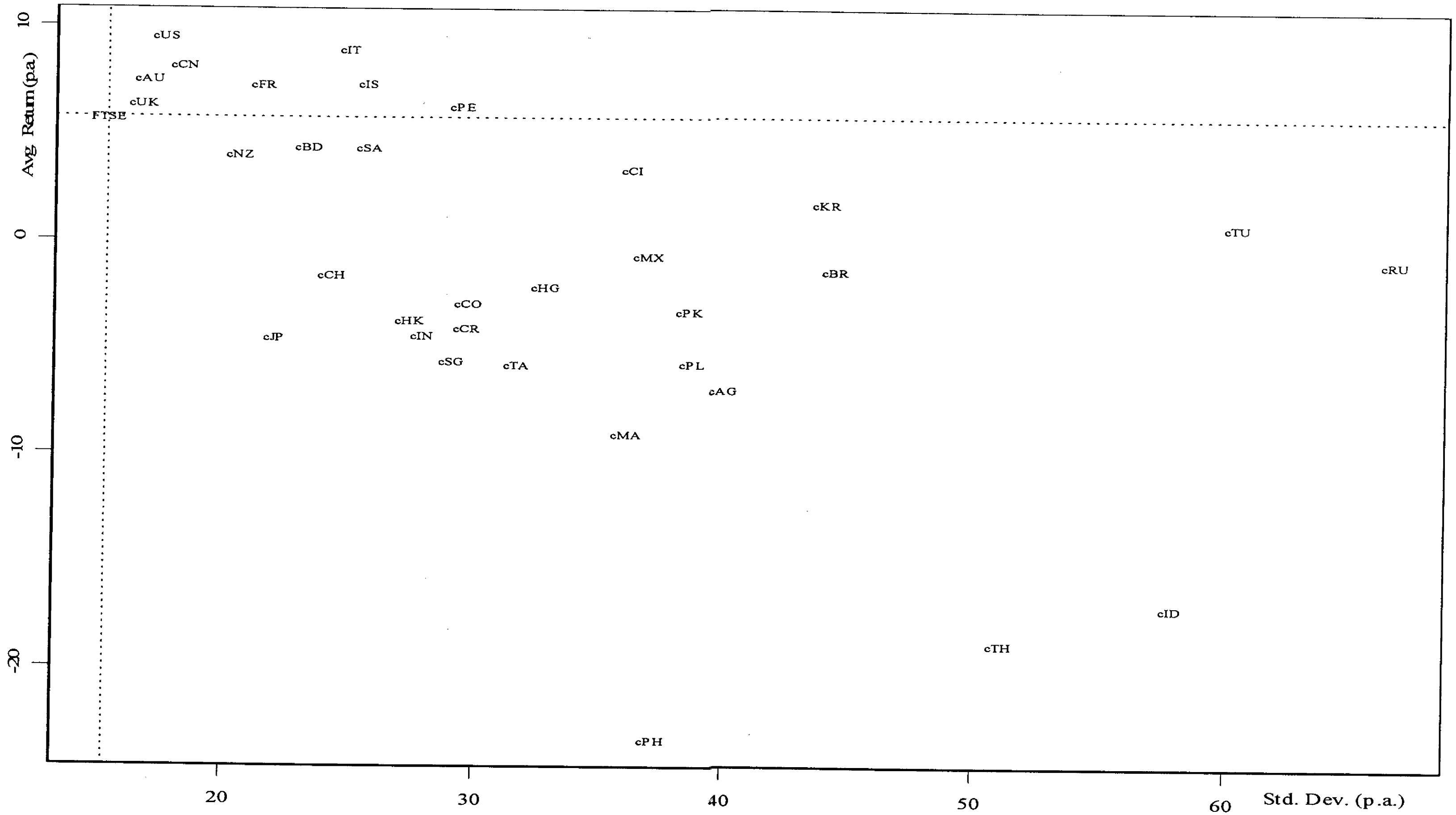

Figure 4.1. The plot of unconditional average market returns and standard deviations (in % p.a.).
The dotted reference lines in the plot are the average return (horizontal line) and standard deviation (vertical line) of FTSE All-World Market Index (FTSE), a proxy for world market performance. All sample markets are indicated by 3-character mnemonics. The weekly (Wednesday-to-Wednesday) market returns are in U.S. dollar and are from FTSE All-World Index Series[TM/SM]. The sample period is from January 1994 to June 25, 2003 (in maximum, 494 observations).

First, Figure 4.1 shows that most of developed markets (especially G7 markets excluding Japan) have, on average, higher unconditional market returns than that of world market portfolio. They also have outperformed almost all 22 emerging markets during the sample period. Second, all markets have exhibited higher volatilities than world market portfolio and most of developed markets (excluding Hong Kong/China and Singapore) are less volatile than their emerging counterparts. Third, it seems that developed markets in DSM Group do perform in a different style and are uniform in their performance because the within-group dispersion is much smaller than the ESM Group.

As mentioned before, market returns in some of the sample countries appear to be serially correlated. In Panel B of Table 4.4, both Schwartz Bayesian (BIC) and Akaike (AIC) information criteria with different maximum number of lags are employed to identify the optimal lag for each market. Of the two information criteria, AIC is biased towards selecting an over-parameterized model with large sample whereas BIC is asymptotically consistent (see Enders (1995), p. 88). Hence, the BIC is used as the major indicator for selecting the optimal lag for each market. As can be seen from Panel B, almost all of optimal lags reported by BIC are 1's with different specifications of maximum number of lags.

It is well documented in empirical studies that high-frequency data are highly non-normally distributed (Fama (1965)), which will lead to spurious statistical inferences without explicit control for nonnormality in regressions. To further explore the properties of data, coefficients of skewness and excess kurtosis are reported in Panel C of Table 4.4, along with several tests on the empirical distribution of data against some well-known distributions, i.e., a normal distribution and several *t*-distributions with different degrees of freedom. A distributional test[59] devised by Richardson and Smith (1993) and Harvey (1995) that is based on Hansen (1982)'s generalized method of moments (GMM) is also provided for two alternative distribution assumptions, adjusted for heteroscedasticity and autocorrelation (HA) for each market return series.

As can be seen from Panel C, for the normal distribution test, both GMM test and traditional tests for normality, i.e., the Jarque-Bera (1982), Kolmogorov-Smirnov and Shapiro-Wilk tests, provide strong evidence against the null hypothesis of normality for almost all 33 market return series at a weekly frequency. The results of the normality tests, along with the significant lags in almost all 33 squared market returns, highlights the importance of the consideration for the nonnormality when building empirical models to test the effectiveness of risk factors. Furthermore, market returns have also been tested against a series of fat-tailed t-distributions with their degrees of freedom

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[59] Following Harvey (1995), the heteroscedasticity and autocorrelation consistent GMM distributional test is used in following system of equations for each national stock market return i:

For the test against normal distribution, the system of moment conditions are specified as follows:

$$e_{1,\,it} = R_{it} - \mu_i,$$
$$e_{2,\,it} = \left(R_{it} - \mu_i\right)^2 - \mathrm{var}_i,$$
$$e_{3,\,it} = \left[\left(R_{it} - \mu_i\right)^3\right] / \mathrm{var}_i^{3/2},$$
$$e_{4,\,it} = \left[\left(R_{it} - \mu_i\right)^4\right] / \mathrm{var}_i^{2} - 3,$$

where, μ is the sample mean, var is the sample variance and $\mathbf{e}_t = \left\{e_{1,\,it}, e_{2,\,it}, e_{3,\,it}, e_{4,\,it}\right\}'$ is a vector of disturbances, where $\mathrm{E}\left(\mathbf{e}_t\right) = 0$. There are four orthogonality conditions and two parameters, implying a χ^2 test with two degrees of freedom. This test statistic is obtained from setting the skewness and excess kurtosis equal to zero in the third and fourth equations. Hence, this specification also forms a joint test of whether the higher moments than two are equal to zero.

In a similar fashion, for a test against t-distribution with an arbitrary degree of freedom of v is tested in the following system of equations:

$$e_{1,\,it} = R_{it}^{T} - 0,$$
$$e_{2,\,it} = \left(R_{it}^{T}\right)^2 - \nu / \left(\nu - 2\right),$$
$$e_{3,\,it} = \left(R_{it}^{T}\right)^3 - 0,$$
$$e_{4,\,it} = \left(R_{it}^{T}\right)^4 - 3\nu^2 / \left[\left(\nu - 2\right)\left(\nu - 4\right)\right],$$

where, R_{it}^{T} is the standardized return and v is the arbitrarily given degrees of freedom. In order to ensure the existence of fourth moment, v must be greater than four. In this specification, there are four orthogonality conditions and one parameter. This leaves a χ^2 test with three degrees of freedom.

varying from one up to 25.[60] Kolmogorov-Smirnov D-statistics indicate that the null hypothesis that a given market return series is from a *t*-distribution with a given degree of freedom is strongly rejected for all 33 markets. Similar conclusions also apply to the HA-consistent GMM test results with an exception of three markets, i.e., Italy, Taiwan/China, and Czech Republic with 22, 20 and 40 degrees of freedom.[60]

Summary statistics for the industry performances are presented in Table 4.5. For ease of exposition, global industry returns are value-weighted from the weekly (Wednesday-to-Wednesday), U.S. dollar-denominated industry returns in each market. In Table 4.5, ten global FTSE Economic Group[61] returns are reported. Panel A shows that there is a significant difference in the performance of each Economic Group in terms of average industry returns, ranging from 10.2 percent p.a. (eNC) to 0.1 percent p.a. (eBI).

When measured in standard deviation, the volatility of each global Economic Group is more uniform than that of markets. This empirical evidence is not a surprise. Since the industry classification is broad enough to define only ten industries versus 33 markets, the average size of a given industry (measured in terms of market capitalization) is much larger than the average size of a given market. As a result, the value-weighted global industry portfolio is more diversified than a local market portfolio. Among ten Economic Groups, "Information Technology (IT)" has the highest volatility (30.4 percent p.a.), twice in the magnitude of the volatility of all other industries. This result is consistent with the fact that during 1994-2003, "IT" has witnessed a much volatile period due to the inflow of "hot" money.

[60] A *t*-distribution with a degree of freedom above 25 is approximately normally distributed. Therefore, a 40 degree of freedom for Czech Republic seems that its market return follows a normal distribution. When examining the normal distribution test, it is found that this could be true as far as HA-consistent GMM test is concerned. The GMM test for normality for Czech Republic is only marginally significant at 10% level.

[61] In order to save space, the summary statistics for 39 weekly, U.S. dollar-denominated, value-weighted world FTSE Industry Sector performances are reported in Appendix B.6. In a broad sense, the results are very similar to the results reported here.

Table 4.5

Summary Statistics for U.S. Dollar-denominated, Value-Weighted Returns on Aggregate FTSE Economic Groups Indices (January 1994 - June 2003)

This table presents the summary statistics for U.S. dollar-denominated, value-weighted returns on aggregate FTSE All-World Economic Group indices during the full sample period from January 12, 1994 to June 25, 2003. The sample comprises 10 Economic Groups for both developed and developing countries. Raw continuously compounded weekly returns are calculated as log changes of Wednesday-to-Wednesday closing total return indices (including both capital gain and dividend yield as provided by Datastream International) from January 5, 1994 (the first Wednesday available in the sample period) to June 25, 2003 (494 observations). Then aggregate FTSE Economic Group returns are value-weighted within a given industry across sample countries. The market capitalizations are collected at the beginning-of-week

In Panel A, primary statistics for 10 aggregate FTSE Economic Groups are reported. Annualized mean and standard deviations of raw returns are reported maximum (minimum) return is the one-week return in percentage within full sample period and maximum (minimum) week is the entry number for the week in which maximum (minimum) return is obtained since the start of the sample period. LQ(k) [LQ^2(k)] is the Box-Ljung Portmanteau test for autocorrelations up to *k*-th lag for raw (squared) returns. Cross-sectional Herfindahl Concentration Indices (HCIs) are obtained by using the beginning-of-week market capitalizations for economic groups/industry sectors as classified by FTSE Global Classification System 2002/2003 within the subject country. The reported HCI for individual national stock market in this table are simple time-series arithmetic average. The HCI would be 100 if a local market were concentrated in one economic group/industry group; its minimum value would be 1/10 (1/36), if every economic group were the same in size as measured by their respective aggregate market capitalizations within the subject country.

In Panel B, optimal lags selected by Akaike Information Criterion (AIC) and Schwartz Bayesian Information Criterion (BIC) are reported at the maximum lags of 6, 12, and 52, respectively. Correspondent *t*-statistics and *p*-values for the optimal lags are also reported.

In Panel C, distributional tests are reported for both normal distribution and an alternative fat-tailed *t*-distribution with degree of freedom of 1, 2, 3, 4, 5, 10, 15, 20, and 25. For *t*-distribution, the smaller is the degree of freedom, the fatter is the tail. Empirically, *t*-distribution with 25 degree of freedom is approximately normally distributed.

Significance at the 1% level is denoted by ***, at the 5% level by **, and at the 10% level by *.

Panel A: Primary Statistics

FTSE Economic Group	Mean [1]	Standard Deviation [1]	Maximum	Maximum Week	Minimum	Minimum Week	Autocorrelation 1	2	3	4	5	6	LQ(6)	LQ(12)	LQ2(6)	Herfindahl Concentration Index
	U.S. Dollar-denominated Index Return (%)		(in one week)													
Resources	7.23	16.92	9.16	270	-9.38	446	-0.084	-0.027	-0.002	-0.017	0.021	-0.052	5.64	11.16	106.93***	29.48
Basic Industries	0.12	16.25	8.38	458	-8.27	401	0.026	0.029	0.011	-0.014	0.057	-0.002	2.53	6.53	40.94***	23.12
General Industries	4.68	17.22	8.78	458	-10.02	402	-0.031	0.001	0.046	-0.059	0.044	0.037	4.95	19.01*	65.52***	32.33
Cyclical Consumer Goods	0.87	17.77	10.11	250	-11.31	402	-0.014	0.044	0.043	-0.091	0.071	-0.015	8.75	12.25	57.70***	32.86
Non-Cyclical Consumer Goods	10.19	14.18	10.39	447	-6.84	243	-0.096	0.076	-0.022	0.012	-0.093	0.016	12.24*	16.21	19.87***	48.83
Cyclical Services	2.35	16.72	9.63	458	-8.64	401	-0.025	-0.034	0.053	-0.007	0.062	0.021	4.41	20.46*	69.74***	37.72
Non-Cyclical Services	2.28	18.35	9.08	480	-11.15	446	-0.026	0.053	0.041	0.019	-0.014	0.053	4.24	12.39	69.41***	30.06
Utilities	1.24	12.93	6.48	404	-10.69	457	-0.035	0.117	-0.054	0.011	-0.067	-0.003	11.15*	19.23*	64.23***	32.84
Financials	3.96	19.10	13.18	458	-9.09	457	-0.071	0.048	-0.009	-0.061	-0.023	-0.002	5.77	22.90**	72.74***	27.96
Information Technology	6.33	30.41	13.87	379	-19.29	363	-0.025	0.008	0.110	-0.056	0.030	0.041	9.32	26.51***	76.43***	61.60

Panel B: Optimal Lags (AR Model) Selected by Schwartz Bayesian (BIC) and Akaike (AIC) Information Criteria

FTSE Economic Group	Maximum Number Lags: 6						12						52					
	BIC			AIC			BIC			AIC			BIC			AIC		
	Optimal Lag	T-stat	P-value	Optimal Lag	T-stat	P-value	Optimal Lag	T-stat	P-value	Optimal Lag	T-stat	P-value	Optimal Lag	T-stat	P-value	Optimal Lag	T-stat	P-value
Resources	1	-1.796*	0.073	1	-1.796*	0.073	1	-1.797*	0.073	1	-1.797*	0.073	1	-1.765*	0.078	1	-1.765*	0.078
Basic Industries	1	0.596	0.552	1	0.596	0.552	1	0.602	0.548	1	0.602	0.548	1	0.701	0.484	1	0.701	0.484
General Industries	1	-0.627	0.531	1	-0.627	0.531	1	-0.646	0.518	8	-1.916*	0.056	1	-0.514	0.608	8	-1.797*	0.073
Cyclical Consumer Goods	1	-0.255	0.799	1	-0.255	0.799	1	-0.240	0.811	5	1.460	0.145	1	-0.120	0.905	1	-0.120	0.905
Non-Cyclical Consumer Goods	1	-2.068**	0.039	2	1.502	0.134	1	-2.140**	0.033	2	1.469	0.142	1	-2.056**	0.040	2	1.436	0.152
Cyclical Services	1	-0.463	0.644	1	-0.463	0.644	1	-0.490	0.624	7	-3.325***	0.001	1	-0.362	0.717	7	-3.292***	0.001
Non-Cyclical Services	1	-0.522	0.602	1	-0.522	0.602	1	-0.527	0.598	1	-0.527	0.598	1	-0.373	0.710	1	-0.373	0.710
Utilities	2	2.539**	0.011	2	2.539**	0.011	1	-0.600	0.549	2	2.440**	0.015	2	2.507**	0.013	2	2.507**	0.013
Financials	1	-1.540	0.124	1	-1.540	0.124	1	-1.517	0.130	1	-1.517	0.130	1	-1.373	0.170	1	-1.373	0.170
Information Technology	1	-0.538	0.591	3	2.441**	0.015	1	-0.554	0.580	7	-3.231***	0.001	1	-0.441	0.659	7	-3.198***	0.001

Panel C: Distributional Tests

FTSE Economic Group	Skewness	Excess Kurtosis	Normal Distribution				T-Distribution										
			GMM_{HAC} $\chi2$ [3]	Jarque-Bera	Kolmogorov-Smirnov (D)	Shapiro-Wilk (W)	GMM_{HAC} $\chi2$ [4]	Kolmogorov-Smirnov (D) [5]									
								1	2	3	4	5	10	15	20	25
Resources	-0.123	1.347	9.396***	38.57***	0.063***	0.984***	9.486**	0.476	0.474	0.473	0.472	0.472	0.471	0.471	0.471	0.471
Basic Industries	-0.019	1.530	19.993***	48.22***	0.042**	0.981***	10.716**	0.474	0.472	0.471	0.471	0.470	0.470	0.469	0.469	0.469
General Industries	-0.382	1.973	12.786***	92.17***	0.063***	0.973***	14.999***	0.475	0.473	0.472	0.471	0.471	0.470	0.470	0.470	0.470
Cyclical Consumer Goods	-0.060	2.058	8.421**	87.44***	0.059***	0.978***	11.478***	0.473	0.471	0.470	0.470	0.469	0.469	0.469	0.469	0.468
Non-Cyclical Consumer Goods	0.101	1.887	6.838**	74.13***	0.048***	0.982***	7.765*	0.481	0.479	0.478	0.478	0.477	0.477	0.477	0.477	0.476
Cyclical Services	-0.046	1.761	12.790***	64.03***	0.049***	0.980***	13.408***	0.473	0.471	0.470	0.470	0.469	0.469	0.468	0.468	0.468
Non-Cyclical Services	-0.503	1.599	6.880**	73.47***	0.067***	0.975***	9.497**	0.476	0.474	0.473	0.473	0.472	0.472	0.471	0.471	0.471
Utilities	-0.631	3.645	3.108	306.33***	0.069***	0.959***	5.893	0.481	0.479	0.479	0.478	0.478	0.478	0.477	0.477	0.477
Financials	0.020	2.066	11.238***	87.88***	0.049***	0.977***	273.396***	0.471	0.468	0.467	0.467	0.466	0.465	0.465	0.465	0.465
Information Technology	-0.345	1.151	3.065	37.07***	0.035	0.988***	4.441	0.463	0.459	0.458	0.457	0.456	0.455	0.455	0.455	0.455

Notes:

For statistical tests and measures:

[1] Means and standard deviations are annualized as follows: for Means, Average Weekly Return × 52; for Standard Deviations, Weekly Standard Deviation × $\sqrt{52}$

[2] Number of Equities data series for some national stock markets within the sample are not available till March 7, 2001. They are G7 countries, Asian/Australasian DSMs, and Brazil, Mexico and South Africa in the ESM group.

[3] Heteroscedasticity-autocorrelation consistent (HAC) GMM test up to the lag of 4, as reported in Panel B using Schwartz Bayesian Information Criterion (BIC). Newey-West consistent standard deviations are used. WinRATS program is provided as an appendix to this chapter.

[4] The test series is demeaned and normalized by sample mean and standard deviation, respectively, thus, moments of the centered *t*-distribution are used to do this HAC-GMM tests. Maximum number of lags is the same as in normality tests.

[5] Almost all D-statistics reported in this column group are significant at 5% level, which strongly reject the null hypothesis that the national stock market index for the subject country is from a *t*-distribution with the given degree of freedom. A series of tests with freedom from 1 to 25 are implemented on the data and the results are the same as presented in this section. Empirically, a *t*-distribution with a degree of freedom of 25 is approximately normally distributed.

The distinctive performance of "IT" may suggest that there could be a market bifurcation between the traditional and "new economy" stocks, consistent with the empirical evidence of "high-tech" effect by Brooks and Catao (2000). For first order autocorrelation coefficients, almost all of them are negative except for "Basic Industries." However, Box-Ljung portmanteau test results with maximum six and twelve lags indicate that only "IT" has possibly significant lag(s) up to twelve lags. For the squared industry returns, the testing results advise that there may be very strong ARCH/GARCH effect for almost all Economic Groups, with LQ statistics all significant at 5 percent level.

The last column of Panel A in Table 4.5 has reported the average Herfindahl concentration index (HCI) for each Economic Group, which measures the concentration of a given Economic Group in terms of markets. As can be seen from that column, most of Economic Groups are more concentrated in terms of markets than markets are in terms of Economic Groups.[62] Among them, "IT" has the highest HCI, 61.6.[63] Given the unusual performance of "IT" industry during the sample period, it is expected that a market with a considerable weight in "IT" (for example, Canada (12.6 percent) and Israel (12.5 percent)) may witness a strong industry factor than those markets with less weight in it.

Panel B and Panel C of Table 4.5 report the optimal lag selected by two information criteria and distributional tests against well-known normal and *t*-distributions for each Economic Group, respectively. In summary, using BICs as an indicator, the testing results on the optimal lag show that one lag is preferred for each Economic Group; as regards distributional tests, normality, as well as *t*-distribution assumption, is rejected for almost all Economic Groups.

4.4.3 Correlation Analysis

[62] With a refined industry classification, i.e., 39 FTSE Industry Sectors, HCIs for each sector are larger than that of an aggregate sector, i.e., 10 FTSE Economic Groups.

[63] This result could reflect the fact that the "new economy" is originated from the developed countries with mature capital markets, in which required funding is easy to acquire and investors are more sagacious and mature.

Table 4.6

Summary of Unconditional Correlations for U.S. Dollar-denominated Returns on National Stock Market Indices (January 1994 – June 2003)

This table presents the summary of unconditional correlations for U.S. dollar-denominated returns on FTSE All-World National Stock Market Indices during the full sample period. Raw continuously compounded weekly returns are calculated as log changes of Wednesday-to-Wednesday closing total return indices (including both capital gain and dividend yield as provided by Datastream International) from January 5, 1994 (the first Wednesday available in the sample period) to June 25, 2003 (in total, 494 observations). The sample comprises 33 major stock markets from both developed and developing countries. Subject countries are grouped firstly according to stages of their economic development, then, according to their geological locations. Among groups, Advanced Emerging Stock Markets group is classified by FTSE. ESM stands for the Emerging Stock Market, and DSM, for the Developed Stock Market. Given that not all countries in this sample have observations for the full sample period, unconditional correlations for those countries which have fewer observations than 494 are calculated by using all observations available to us. Hence, obtained correlations represent latest relationship between those countries and others. SMPL is the proxy for the world return index computed by capital-weighting sample countries surveyed in this dissertation. "FTSE" is a market capitalization-weighted world return proxy calculated across all 48 constituent countries within FTSE All-World Index provided by FTSE International (Datastream downloading mnemonic: WIWRLD$). Group arithmetic averages are also reported.

Group	Sub-group	Country	Devoloped Stock Markets (DSM)											Emerging Stock Markets (ESM)																					
			G7							*Asia/Australasia*				*Advanced*						*Asia*							*Europe*					*Lat. America*			
DSM	G7	Canada	*cCN*																																
		United States	0.74	*cUS*																															
		France	0.58	0.62	*cFR*																														
		Germany	0.60	0.66	0.82	*cBD*																													
		United Kingdom	0.55	0.65	0.76	0.71	*cUK*																												
		Italy	0.47	0.48	0.69	0.66	0.59	*cIT*																											
		Japan	0.32	0.28	0.32	0.33	0.28	0.26	*cJP*																										
		Sub-group Avg.				***0.54***																													
	Asia/ Australasia	Australia	0.52	0.47	0.48	0.49	0.50	0.43	0.32	*cAU*																									
		New Zealand	0.34	0.31	0.33	0.35	0.37	0.31	0.23	0.57	*cNZ*																								
		Hong Kong/China	0.47	0.44	0.39	0.41	0.45	0.36	0.29	0.47	0.38	*cHK*																							
		Singapore	0.34	0.33	0.31	0.33	0.36	0.26	0.31	0.41	0.40	0.65	*cSG*																						
		Sub-group Avg.				***0.37***					***0.48***																								
ESM	Advanced	Brazil	0.41	0.40	0.32	0.36	0.32	0.35	0.23	0.35	0.29	0.35	0.26	*cBR*																					
		Mexico	0.47	0.46	0.37	0.37	0.34	0.33	0.23	0.33	0.27	0.34	0.24	0.62	*cMX*																				
		Israel	0.31	0.35	0.35	0.35	0.32	0.29	0.11	0.22	0.16	0.21	0.20	0.31	0.29	*cIS*																			
		Korea	0.32	0.33	0.31	0.34	0.32	0.29	0.35	0.32	0.35	0.42	0.35	0.27	0.27	0.20	*cKR*																		
		Taiwan	0.27	0.30	0.28	0.30	0.24	0.23	0.22	0.29	0.28	0.35	0.38	0.17	0.22	0.17	0.34	*cTA*																	
		South Africa	0.40	0.33	0.40	0.43	0.38	0.28	0.24	0.44	0.33	0.32	0.30	0.36	0.32	0.24	0.32	0.29	*cSA*																
		Sub-group Avg.				***0.32***					***0.31***					***0.29***																			
	Asia	India	0.15	0.11	0.14	0.14	0.10	0.19	0.10	0.19	0.15	0.18	0.17	0.12	0.08	0.16	0.18	0.20	0.19	*cIN*															
		Pakistan	0.07	0.05	0.01	0.04	0.03	0.03	-0.03	0.11	0.04	0.06	0.12	0.15	0.11	0.06	0.05	0.08	0.10	0.22	*cPK*														
		China	0.12	0.08	0.07	0.09	0.08	0.00	0.09	0.18	0.13	0.33	0.22	0.08	0.07	0.03	0.14	0.17	0.20	0.06	-0.02	*cCI*													
		Indonesia	0.12	0.10	0.11	0.11	0.10	0.10	0.15	0.24	0.25	0.31	0.42	0.16	0.15	0.08	0.19	0.18	0.18	0.05	0.03	0.16	*cID*												
		Malaysia	0.25	0.17	0.12	0.15	0.13	0.09	0.15	0.26	0.27	0.43	0.54	0.09	0.12	0.08	0.20	0.29	0.22	0.15	0.16	0.26	0.45	*cMA*											
		Philippines	0.22	0.18	0.15	0.18	0.19	0.16	0.17	0.31	0.34	0.38	0.51	0.22	0.23	0.11	0.24	0.26	0.26	0.16	0.10	0.23	0.46	0.46	*cPH*										
		Thailand	0.29	0.25	0.21	0.23	0.26	0.22	0.22	0.31	0.33	0.49	0.58	0.21	0.24	0.12	0.37	0.30	0.34	0.15	0.12	0.22	0.37	0.50	0.47	*cTH*									
		Sub-group Avg.				***0.13***					***0.28***					***0.17***							***0.23***												
	Europe	Czech Republic	0.30	0.24	0.38	0.37	0.35	0.31	0.11	0.19	0.21	0.33	0.22	0.27	0.30	0.16	0.28	0.19	0.35	0.10	0.10	0.18	0.18	0.21	0.20	0.21	*cCR*								
		Hungary	0.44	0.40	0.45	0.47	0.43	0.47	0.23	0.36	0.38	0.39	0.30	0.45	0.46	0.32	0.37	0.14	0.43	0.18	0.10	0.06	0.15	0.13	0.21	0.26	0.56	*cHG*							
		Poland	0.33	0.28	0.31	0.29	0.25	0.22	0.17	0.22	0.22	0.19	0.17	0.29	0.28	0.18	0.20	0.15	0.31	0.15	0.13	0.07	0.12	0.15	0.27	0.25	0.45	0.56	*cPL*						
		Turkey	0.22	0.22	0.19	0.22	0.21	0.13	0.11	0.16	0.16	0.15	0.12	0.24	0.18	0.19	0.15	0.10	0.21	0.12	0.09	0.04	0.04	0.06	0.11	0.20	0.25	0.37	0.18	*cTU*					
		Russia	0.30	0.26	0.27	0.31	0.29	0.28	0.18	0.24	0.29	0.31	0.28	0.36	0.40	0.25	0.27	0.25	0.46	0.20	0.06	0.07	0.17	0.21	0.15	0.32	0.32	0.44	0.34	0.35	*cRU*				
		Sub-group Avg.				***0.29***					***0.24***					***0.27***							***0.15***						***0.38***						
	Lat. America	Argentina	0.30	0.31	0.26	0.27	0.25	0.30	0.13	0.26	0.21	0.33	0.26	0.52	0.51	0.20	0.20	0.21	0.25	0.08	0.07	0.12	0.14	0.15	0.26	0.23	0.22	0.29	0.16	0.15	0.32	*cAG*			
		Chile	0.34	0.35	0.23	0.24	0.24	0.25	0.17	0.32	0.28	0.29	0.29	0.48	0.43	0.23	0.27	0.22	0.29	0.18	0.11	0.08	0.24	0.19	0.26	0.26	0.20	0.37	0.20	0.21	0.31	0.47	*cCH*		
		Colombia	0.12	0.13	0.05	0.11	0.07	0.12	-0.04	0.15	0.15	0.09	0.13	0.16	0.11	0.14	0.10	0.11	0.10	0.03	0.17	0.02	0.19	0.07	0.21	0.16	0.14	0.25	0.10	0.10	0.16	0.12	0.21	*cCO*	
		Peru	0.19	0.14	0.14	0.14	0.11	0.22	0.08	0.19	0.19	0.21	0.18	0.30	0.27	0.21	0.18	0.13	0.23	0.11	0.04	0.08	0.23	0.18	0.25	0.18	0.19	0.30	0.13	0.06	0.28	0.28	0.39	0.23	*cPE*
		Sub-group Avg.				***0.19***					***0.22***					***0.24***							***0.15***						***0.21***				***0.28***		
FTSE All-world Market Index			0.76	0.93	0.78	0.80	0.79	0.62	0.51	0.57	0.40	0.52	0.42	0.44	0.50	0.39	0.42	0.36	0.42	0.15	0.04	0.11	0.15	0.21	0.24	0.31	0.33	0.48	0.33	0.26	0.32	0.34	0.37	0.11	0.18
		Sub-group Avg.				***0.74***					***0.48***					***0.42***							***0.17***						***0.34***				***0.25***		

Mean-variance portfolio theory of Markowitz (1952) states that the potential gains from international diversification are realized if the cross-correlation between national stock markets is not perfect. This section will examine the unconditional correlation matrix of 33 markets.

Table 4.6 presents the cross-market unconditional correlation matrix for U.S. dollar-denominated market returns. Within DSM Group, on average, "G7" has the highest within-group correlation coefficient[64] of 0.54, followed by "Asia/Australasia," 0.48. A closer look at the correlation coefficients in "G7" reveals a strong regional pattern. For example, the correlation between Canada and the U.S. is about 0.74; the correlations among three major economies in Europe, i.e., France, Germany and the U.K. are all well above 0.70. Japan seems a bit detached from other six countries in "G7" with correlations ranging from 0.26 (with Italy) to 0.33 (with Germany). On theother hand, the inter-regional correlations with other country sub-groups are not as impressive as intra-region correlations, though still high when compared with the inter-regional correlations of other sub-groups. This regional pattern also exists in the "Asia/Australasia" sub-group, which shows a strong link between Australia and New Zealand, and between Hong Kong/China and Singapore. The relatively high correlations among developed markets are consistent with a recent study by Longin and Solnik (1995) on increasing correlations among major developed markets.

Within ESM Group, "Europe" has the largest average intra-group correlation coefficient of about 0.38. Other Country Sub-Groups are moderately correlated with "Advanced," "Latin America" and "Asia" being 0.29, 0.28, and 0.23, respectively. At the first glance, it is surprising to see that the "Europe" has the highest average correlation coefficient due to the low average intra-group correlations in other sub-groups. However, Table 4.4 shows that most of member markets of "Europe" have shorter return history than other sub-groups. Therefore, the reported average intra-group correlation coefficient could be roughly explained as the most recent correlation between markets. It may be consistent with the observation by Bekaert and Harvey (2002) that the correlation between emerging markets has increased during 1990s and early 2000s. On the other hand, it may also be the result of contagion effect bringing

[64] Cautions must be exercised when interpreting the results in that simple sub-group arithmetic averages are reported in order to save space. For individual market, different results could be produced.

together the major stock markets in a region. Interestingly, within "Advanced," the only ESM Sub-Group without special consideration for regional assignment, the regional pattern also appears. Among them, Brazil and Mexico has the highest correlation coefficient of 0.62, followed by Korea and Taiwan/China pair of 0.34. Brazil and Mexico also have strong ties with "Latin America," especially with Argentina and Chile, correlation coefficients being 0.52 and 0.48, respectively.

Another interesting picture emerges when comparing country sub-group averages by rows. All ESM Sub-Groups, except for "Advanced," have the higher intra-regional than inter-regional correlation coefficients. As regards their correlations with "G7," almost all ESM Sub-Groups, on average, are not perfectly correlated with "G7" markets, which suggest the possible diversification gains from a portfolio mixing "G7" developed markets with emerging markets.

When examining the correlations between each Country Sub-Group and FTSE Market Index, the proxy for world market portfolio, it is not surprising to see that the highest correlation coefficient is owned by "G7" group (0.74), followed by "Asia/Australasia" (0.48) and "Advanced" (0.42), due to their close integration with world capital market via strong economic ties.

The correlation between emerging markets and FTSE Market Index, however, is relatively low, indicative of the presence of market segmentation phenomenon in emerging markets (Bekaert (1995)). This low correlation documented in Table 4.6 may also be attributed to the dissimilarity in their respective industrial structures (Roll (1992); Bekaert and Harvey (2002)). That is, if a country has an industrial structure much different from the world's average structure, its capital market may have little or no correlation with world capital market. Hence, the evidence in Table 4.6 cannot just be ascribed to the market segmentation argument, especially in the context of this study in which most of emerging markets have opened to international investors and constituent securities used to construct each industry or market index are accessible to international investors as well (see Section 4.2 for an introduction to FTSE All-World Index Series$^{TM/SM}$). Furthermore, since only unconditional correlations are provided in Table 4.6, conclusions drawn in the above could be spurious without explicit consideration for the dynamic feature of the development of world capital market.

Two regularities emerge from the analysis on the correlation matrix of market returns. First, the correlations between markets and between a given market and world capital market may be determined by the stages of economic development of their domicile countries. In other words, the more advanced an economy is, the stronger the correlation between its capital market and world market, so is its correlation with other advanced economies. For example, "G7" and "Asia/Australasia" have relatively large average intra-group correlation coefficient of 0.50, which is much larger that other intra-group correlation coefficients. Second, in association with the analysis of extreme market returns in Section 4.4.2, there seems a *weak* regional factor present within emerging markets as well as developed markets.[65] This empirical evidence prompts us that emerging markets perform differently from developed markets and regionalism may also be an important factor in determining emerging market performance.

Table 4.7
Summary of Unconditional Correlations for U.S. Dollar-Denominated, Value-Weighted Ten Economic Group Index Returns (January 12, 1994 – June 25, 2003)

This table presents the summary of unconditional correlations for value-weighted, U.S. dollar-denominated index returns on ten FTSE economic groups during the full sample period. Raw continuously compounded weekly returns are calculated as log changes of Wednesday-to-Wednesday closing total return indices (including both capital gain and dividend yield as provided by Datastream International) from January 12, 1994 (the first Wednesday available in the sample period) to June 25, 2003 (in total, 494 observations). Weekly (Wednesday-to-Wednesday) individual industry weights are calculated by using the beginning-of-the-week (i.e. from January 5, 1994 through June 18, 2003), U.S. dollar-denominated market capitalizations for each constituent economic group in each sample country.

FTSE Economic Group	Mne-monics	eRS	eBI	eGI	eCG	eNC	eCS	eNS	eUT	eFI	eIT
Resources	eRS	1.00									
Basic Industries	eBI	0.58	1.00								
General Industries	eGI	0.54	0.80	1.00							
Cyclical Consumer Goods	eCG	0.42	0.78	0.79	1.00						
Non-Cyclical Consumer Goods	eNC	0.42	0.50	0.59	0.43	1.00					
Cyclical Services	eCS	0.47	0.76	0.89	0.76	0.58	1.00				
Non-Cyclical Services	eNS	0.38	0.55	0.71	0.56	0.44	0.73	1.00			
Utilities	eUT	0.53	0.49	0.52	0.41	0.49	0.46	0.38	1.00		
Financials	eFI	0.52	0.78	0.85	0.73	0.66	0.84	0.68	0.54	1.00	
Information Technology	eIT	0.32	0.51	0.72	0.57	0.32	0.71	0.66	0.24	0.60	1.00

[65] Here, the term "weak" is used because the significance of regional effect is very sensitive to the country grouping strategy.

Table 4.8

Summary of Unconditional Correlations for U.S. Dollar-Denominated, Equally-Weighted Ten Economic Group Index Returns (January 12, 1994 – June 25, 2003)

This table presents the summary of unconditional correlations for equally-weighted, U.S. dollar-denominated index returns on ten FTSE economic groups during the full sample period. Raw continuously compounded weekly returns are calculated as log changes of Wednesday-to-Wednesday closing total return indices (including both capital gain and dividend yield as provided by Datastream International) from January 12, 1994 (the first Wednesday available in the sample period) to June 25, 2003 (in total, 494 observations). Weekly (Wednesday-to-Wednesday) individual industry weights are calculated by using the beginning-of-the-week (i.e. from January 5, 1994 through June 18, 2003), U.S. dollar-denominated market capitalizations for each constituent economic group in each sample country.

FTSE Economic Group	Mne-monics	eRS	eBI	eGI	eCG	eNC	eCS	eNS	eUT	eFI	eIT
Resources	eRS	1.00									
Basic Industries	eBI	0.81	1.00								
General Industries	eGI	0.75	0.86	1.00							
Cyclical Consumer Goods	eCG	0.69	0.84	0.85	1.00						
Non-Cyclical Consumer Goods	eNC	0.75	0.82	0.81	0.77	1.00					
Cyclical Services	eCS	0.71	0.84	0.87	0.84	0.79	1.00				
Non-Cyclical Services	eNS	0.70	0.75	0.81	0.70	0.73	0.77	1.00			
Utilities	eUT	0.75	0.74	0.71	0.68	0.75	0.70	0.69	1.00		
Financials	eFI	0.79	0.89	0.89	0.84	0.85	0.86	0.80	0.79	1.00	
Information Technology	eIT	0.59	0.67	0.77	0.68	0.57	0.73	0.74	0.52	0.69	1.00

Table 4.7 summarizes the unconditional cross-industry correlations with global industry returns being value-weighted from ten FTSE Economic Groups in each market.[66] As shown in Table 4.5, most of industries under both industry classification systems are more concentrated in terms of markets than markets in terms of industries. In order to minimize the impact from markets, Table 4.8 also reports the unconditional correlations on an equally-weighted basis.

Both tables show that unconditional industry correlation coefficients are all positive and substantially higher than those computed from market returns. Equally-weighted correlations are much higher than value-weighted correlations, consistent with Heston and Rouwenhorst (1994).

Armed with the evidence in this section, it is likely to conclude that a portfolio diversified across markets is better than a portfolio diversified across industries, as demonstrated in Solnik (1974). For the former case, an international portfolio will generate more benefits to investors if it can be diversified between developed and

[66] Due to the space limitation, summary of the unconditional correlations computed from 39 FTSE Industry Sectors, a refined industry classification, both equally- and value-weighted, are reported in Appendices 4.7 and 4.8 to this Chapter. Major conclusions are very similar to the results reported here.

emerging markets. Unfortunately, these conclusions are quite weak. Besides the argument of unstable correlations between markets throughout time (see critics in Section 2.5.2 of Chapter 2 on the use of correlation matrix as the evidence to support the notion of the international portfolio diversification), the empirical results presented in this section also suffer another important deficiency. It should be noted that in Tables 4.6, U.S. dollar denominated market returns are used to compute the correlations across markets. Such returns have two components: the first one is the return attributable to the overall performance of a national stock market. The second component is the currency return, i.e., the return attributable to the changes of the foreign exchange rates—local currency versus U.S. dollars. Accordingly, the foreign exchange risk is incorporated in these returns. Hence, from Tables 4.6, the increased correlations between stock markets may be attributed to highly-correlated foreign exchange fluctuations among currencies. This phenomenon may be more pronounced in emerging markets, whose governments may have introduced currency pegging system to major currencies, such as U.S. dollar. For these reasons, spurious correlations are introduced via currency component and the correlation coefficients as presented in above tables would possibly exaggerate true correlations. Similar arguments also apply to cross-industry correlations presented in Tables 4.7 and 4.8. Therefore, cautions must be exercised when interpreting the results in these tables

4.5 Chapter Summary

This thesis has used 33 major stock markets from the FTSE All-World Index Series$^{TM/SM}$ to examine the relative importance of industry, country and regional factors in market performance during 1994-2003.

Summary statistics in Section 4.4 have shown that emerging markets have exhibited lower average returns and higher volatilities than developed markets during the sample period. Cross-market correlation analysis, combined with extreme observation analysis in Section 4.4.2, provides weak evidence that there may exist some regional effects in emerging markets and emerging markets may behave different from their developed counterparts. Meanwhile, the analysis on the cross-industry correlation matrix also confirms that the industry factor would have some impact on market performance. However, the empirical evidence presented in this chapter is not adequate to justify this hypothesis.

CHAPTER V

EMPIRICAL RESULTS: INDUSTRY AND COUNTRY FACTORS IN MARKET PERFORMANCE

5.1 Introduction

As elaborated in the previous chapters, this study has two specific purposes. The first purpose is to investigate the reasons behind disparate market performances into a dichotomy between the country-specific and industry-specific factors. The second purpose is to explore the contribution of the regional factor to the emerging market performances.

This chapter is dedicated to the first purpose to examine the relative importance of industry and country factors in explaining the variation in the realized market returns and volatilities. The remainder of this chapter is organized as follows. Section 5.2 presents the empirical results based on a full sample period (or static) analysis. Section 5.3 concentrates on the dynamic feature of the industry and country factors in each stock market, represented by the time-series plots of the means (medians) and standard deviations (MADs) of each factor that is aggregated across industries/countries and computed within a rolling window of 36 weeks. Section 5.4 summarizes the major findings of this chapter.

5.2 Full Sample Period Analysis

As an introduction to this section, following Roll (1992), regression results of a simple model with squared market returns being used as the proxy for the realized market volatilities and the Herfindahl concentration index being used as the proxy for the industrial composition in a given market index are presented in Section 5.2.1. Different methodologies employed in the previous research, such as the variance ratio analysis, are also used in Sections 5.2.2 and 5.2.3 to examine the relative importance of the industry and country factors in explaining the variation in the realized market returns during the full sample period. Then, in Section 5.2.4, two regression-based analyses are provided as a conclusion to this section.

5.2.1 Herfindahl Concentration Index and Market Volatilities

Roll (1992) argues that the presence of the industry factor is largely due to the technical aspect of the national stock market indices. That is, the rise of the industry factor in pricing asset returns in a given market is introduced via the industry concentration phenomenon in that market. Thus, the swings of stocks within an industry that dominates a market will exert significant impact on the performance of that market. As suggested in the existing literature, one of the natural candidates to measure the industrial concentration phenomenon in a given market is the Herfindahl concentration index (HCI). (For details on how to construct the HCI in a given market, please refer to Section 3.2.1 of Chapter 3.) To ascertain whether the observed market volatilities[67] are related to the technical aspect of the construction of the market index, a simple time-series regression as follows is run for each market (see Chapter 3 for details):

$$\ln(S_j) = b_0 + b_1 HCI_j, \quad j = 1, \ldots, 33$$

For each market, two HCIs are used in the above regression. One is computed using the market capitalizations of ten broad FTSE Economic Groups available in each market; while, the other is computed using the market capitalizations of 39 refined FTSE Industry Sectors. Thereby, the sensitivity of the market volatilities (represented by the squared raw market returns of each market) to different industry classification systems can also be tested. The regression results are presented in Table 5.1. The first two columns report the regression results under a broad industry classification—ten FTSE Economic Groups. Table 5.1 shows that five countries in "G7"—Canada, the U.S., Germany, the U.K. and Japan—have significant slope coefficients for their respective HCIs. Their slope coefficients are much larger in their absolute values than the markets in other Country Sub-Groups. This marked contrast suggests that the industry factor, measured as HCI, may be an important contributor to the market volatilities of most G7 countries. Among them, the U.S. has the largest coefficient, about 0.33 with the expected positive sign, suggesting that a higher industry concentration leads to higher market volatility. It is followed by the U.K. (about 0.23). What is surprising is that Japan and Germany have the expected significant HCI coefficients, about -0.21 for each country, but with the unexpected negative signs. These results are counterintuitive at first sight: Why does a high HCI lead to low market volatility in Japan and Germany? One possibility may be attributable to the misspecification of HCI as a proxy for the industry factor, which may be less reflective of the industry structure in these two markets.

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[67] This thesis does not examine the relationship between market returns and HCI measure in a linear formulation for the reason that the possible values for returns could be ranging from negative infinity to positive infinity, whereas for HCI measure in this study, ranging from 0 to 100. Hence, unless a non-linear functional is formulated; the linear regression results are meaningless for analysis in context of this study. Details on the model are given in Chapter 3.

Table 5.1

Herfindahl Concentration Indices and Squared, U.S. Dollar-Denominated Market Returns (January 1994 – June 2003)

This table reports the sensitivity (slope coefficient and its standard deviation) of a market's volatility, proxied by its squared, U.S. dollar-denominated, weekly market returns (aggregated from industry returns on both ten FTSE Economic Groups and 36 FTSE Industry Sectors) to Herfindahl concentration index (HCI), representative of the technical aspects of the index construction (industry structure), during the full sample period of January 1994 through June 2003. The model is formulated as follows:

$$\ln(S_j) = b_0 + b_1 HCI_j, \quad j = 1,L\ ,33$$

HCI for each industry classification system is computed from the beginning-of-the-week market capitalization for each constituent FTSE Economic Group/FTSE Industry Sector within a market. Significance at the 1% level is denoted by ***, at the 5% level by **, and at the 10% level by *.

Group	Sub-group	Country	Herfindahl Concentration Index: FTSE Economic Group Slope Coef.	FTSE Economic Group Std. Dev.	FTSE Industry Sector Slope Coef.	FTSE Industry Sector Std. Dev.
DSM	G7	Canada	0.08*	0.04	0.19***	0.06
		United States	0.33***	0.06	0.27***	0.09
		France	-0.19	0.13	0.50***	0.09
		Germany	-0.21***	0.05	-0.49***	0.14
		United Kingdom	0.23***	0.07	0.17***	0.05
		Italy	0.01	0.06	-0.03	0.06
		Japan	-0.21***	0.06	-0.57***	0.15
	Asia/ Australasia	Australia	0.04	0.03	-0.01	0.07
		New Zealand	> 0.00	0.03	0.01	0.02
		Hong Kong/China	-0.02	0.03	-0.05	0.04
		Singapore	-0.01	0.04	-0.01	0.03
ESM	Advanced	Brazil	-0.01	0.04	-0.03	0.03
		Mexico	-0.02	0.04	-0.03	0.03
		Israel	0.01	0.01	0.01	0.01
		Korea	0.11***	0.03	0.06**	0.02
		Taiwan/China	0.07**	0.03	0.05***	0.01
		South Africa	0.02	0.03	> 0.00	0.01
	Asia	India	0.13**	0.06	0.19**	0.08
		Pakistan	0.04*	0.03	0.06***	0.02
		China	-0.03	0.04	-0.01	0.03
		Indonesia	0.03	0.04	0.15***	0.04
		Malaysia	-0.09	0.08	-0.16	0.10
		Philippines	-0.11***	0.04	-0.04	0.09
		Thailand	0.02***	0.01	0.06***	0.01
	Europe	Czech Republic	0.01	0.03	-0.05	0.04
		Hungary	0.04	0.05	0.04	0.05
		Poland	0.04*	0.02	0.07***	0.02
		Turkey	0.03**	0.01	0.02	0.02
		Russia	-0.05***	0.01	-0.05***	0.01
	Lat. America	Argentina	-0.03	0.02	-0.02	0.01
		Chile	0.06***	0.01	0.05***	0.01
		Colombia	-0.06	0.05	-0.09**	0.05
		Peru	-0.01	0.01	0.01	0.01

Another possibility is that some missed factors, such as world and country factors, may play a more important role in these two markets than their industry factors do. A further surprise, for the developed markets with high average time-series HCIs (see Tables 4.4

and 4.5 in Chapter 4)—Italy, New Zealand, Hong Kong/China, and Singapore, they do not exhibit significant exposures to HCIs as expected. This evidence further increases the concern that the HCI may be a poor proxy for industry factor.

As of the 22 emerging market countries, the first two columns in Table 5.1 show that there are only ten countries having significant HCI coefficients. A closer look at the geographic affiliations of these countries, Table 5.1 reveals that most of them are located in Asia (six out of the nine countries) and Europe (three out of the six countries). By contrast, only one emerging market located in Latin America, i.e., Chile, has significant HCI coefficient.[68] Among the ten emerging markets with significant HCI coefficients, India has the largest coefficient measured in absolute value, about 0.13. This estimation result may be a true story for India because it has a sizable share in "Basic Industries" (see Tables 4.2 and 4.3 in Chapter 4). Meanwhile, Thailand has the least, about 0.02. As expected, most of them have the expected positive signs for their respective HCI coefficients (with the exception of the Philippines and Russia), consistent with the hypothesis by Roll (1992) that a more industrially concentrated market will display a greater market volatility, due to the extra volatility introduced into realized market returns from the industry factor.

Does a refined industry classification system lead to a better result? With a refined industry classification system, the last two columns in Table 5.1 demonstrate that most countries with significant exposures to the HCIs computed from market capitalizations of ten FTSE Economic Groups, have increased in the magnitude of their respective HCI coefficients with the expected positive signs. For example, Canada has increased its exposure from 0.08 to 0.19, so is its significance level. This is consistent with the hypothesis set out by Beckers, Connor and Curds (1996) and Griffin and Karolyi (1998) that a market's exposure to the industry factor grows within a finer industry classification system. However, it is still a puzzle to see that Germany and Japan still have the negatively signed coefficients. For Germany, there is a significant increase in the absolute magnitude of its HCI coefficient, from 0.21 to 0.49.

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[68] This result is also surprising. In Panel A of Table 4.4, most of emerging markets located in Latin America have relatively larger average HCI indices among all 33 countries. The magnitude of HCI for each component country in this sub-group is also more homogenous than other sub-groups (see Chapter 4 for further information).

As a summary, two regularities emerge from the above analysis. The first one is that various industry compositions *do* have some impact on market volatilities. This phenomenon is more pronounced in G7 countries with much advanced economies. The second regularity is that developed markets behave differently from their emerging counterparts with regard to their different level of exposures to their repetitive industrial compositions during the period of 1994-2003. Of course, the validity of the regression results in Table 5.1 highly depends on the correctness of the model specification, on the quality of proxies for the industry factor and market volatilities, and on the normality and the independence of the regression residuals.

As argued in Chapter 3,[69] HCIs and the regression model used in Table 5.1 only provide a partial picture of the importance of the industry factor in explaining the disparate market performances. Nevertheless, the estimation results in Table 5.1 do encourage further study on the importance of the industry factor in determining market performance but with a more appropriate proxy than the HCI. Thanks to Heston and Rouwenhorst (1994) and Griffin and Karolyi (1998), their dummy variable regression model allows a decomposition of a given market return into its orthogonal country and industry components in a cross-sectional fashion of Fama and MacBeth (1973). In what follows, estimated factor loadings from the dummy variable regression model will be used as proxies for industry and country factors. Summary statistics on these estimated factors and the associated tests on the contribution of each factor to the realized market returns and volatilities will be examined.

5.2.2 Summary Statistics of Estimated "Pure" Industry and Country Factors

This section provides the summary statistics for the industry and country factors estimated via Heston and Rouwenhorst (1995) style dummy variable regression model. In order to compare the performance of each factor in different types of markets, 33 stock markets used in this thesis have been grouped into three country samples: a sample comprising all 33 markets (or "all" sample), a sample consisting of all eleven developed markets (or "developed" sample) and a sample consisting of all 22 emerging

[69] Chapter 3 has shown that HCI is a weighted, aggregate measure based on the interactive term between, or a product of, the price and the number of issued shares for constituent stocks within a given industry. Hence, it only provides a notion of average proportions of each industry in a country rather than of the industries themselves.

markets (or "emerging" sample). Furthermore, for each country sample, industry and country factors have been estimated from the returns both on ten FTSE Economic Groups and on 39 FTSE Industry Sectors available in each market for a sensitivity test.

Table 5.2 provides the summary statistics for the world benchmark return, industry and country factors estimated from industry returns on ten FTSE Economic Groups during the period of 1994-2003. Together with means and standard deviations, Table 5.2 also provides three robust measures of location—medians, trimmed means with 1 percent and 5 percent with the extreme observations being removed from *both* ends of the sorted factor loadings, and one robust measure of dispersion—median absolute deviations (MADs).[70] All statistics are expressed in percentage per annum. The use of four robust measures in this table grounds upon the fact that during the sample period, most of 33 markets have experienced some unusual events, such as the Asian Financial Crises of 1997-1998 and the 9/11 Terrorists Attack of 2001 in the U.S., that tend to produce outliers. The conventionally reported mean and standard deviation measures are sensitive to the existence of outliers and will provide spurious results regarding the time-series performance of each factor. As a result, these robust measures are provided in hope to provide a more complete picture on the role of each factor in a given market. Further, Sharpe ratio, computed as a ratio of the mean to the standard deviation of each factor, is also provided as a proxy for the risk-adjusted risk premium.

Given the disparate performances of industry and country factors in developed and emerging markets, Table 5.2 not only provides the summary statistics on each factor estimated from "all" sample, but also offers the summary statistics on the factors estimated from "developed" and "emerging" samples for a comparison.

[70] Note that for MAD (median of absolute deviation) measures used in this thesis, the population centre is defined as the median of a given data series and the MAD is computed as the median of the data series that deviates from its median.

Table 5.2

Summary Statistics of Value-Weighted World Benchmark Return, "Pure" Industry Factors (Estimated from Ten FTSE Economic Groups) and "Pure" Country Factors (January 1994 - June 2003)

This table reports summary statistics for the value-weighted world benchmark return, "pure" industry factors and "pure" country factors, estimated from industry returns of FTSE Economic Group Indices within each market via a dummy variable regression model of Heston and Rouwenhorst (1994), during the full sample period, i.e., January 1994 – June 2003. Along with the conventional measures, such as means and standard deviations, this table also provides three robust measures of location, i.e., medians, trimmed means with 1% and 5% of extreme observations at both ends of a sorted data series removed. Median absolute deviation is also provided as a robust measure of the dispersion of the data. Sharpe ratio is computed as a ratio of mean and standard deviation. It is used as a measure of risk-adjusted risk premia for the corresponding factor loadings for industry and country factors. Panel A summarizes the estimated value-weighted world benchmark return and industry factors. Panel B summarizes the estimated country factors. In Panel B, the column under "Developed (Emerging) Markets Only" is a summary for estimated country factors from the DSM group and ESM group respectively. All statistics are expressed in % per annum.

Panel A: World Benchmark Return and "Pure" Industry Factors (Estimated from Industry Returns on Ten FTSE Economic Group Indices in Each Market)

	All Sample Markets							Developed Markets Only							Emerging Markets Only						
	Mean	Stdev	Sharpe Ratio	Median	Trimmed Mean (1%)	Trimmed Mean (5%)	Median Abs. Deviations	Mean	Stdev	Sharpe Ratio	Median	Trimmed Mean (1%)	Trimmed Mean (5%)	Median Abs. Deviations	Mean	Stdev	Sharpe Ratio	Median	Trimmed Mean (1%)	Trimmed Mean (5%)	Median Abs. Deviations
Cap-weighted World Benchmark Return	3.24	16.36	0.20	8.89	3.92	4.67	13.16	-2.98	16.85	-0.18	-2.34	-2.96	-1.95	14.38	-8.92	25.09	-0.36	0.63	-10.90	-7.39	20.78
Resources	8.81	23.28	0.38	12.21	7.00	6.89	18.26	15.32	29.38	0.52	12.92	10.95	8.65	20.48	5.99	21.56	0.28	7.26	4.12	4.19	15.91
Basic Industries	2.17	19.55	0.11	2.81	1.76	3.79	12.46	12.77	20.62	0.62	11.13	13.61	12.94	13.87	-1.02	19.82	-0.05	1.00	-0.99	1.56	13.25
General Industries	-18.98	29.00	-0.65	-19.36	-20.67	-21.37	20.46	3.80	14.69	0.26	4.53	5.16	5.88	11.97	-21.71	30.08	-0.72	-17.07	-23.42	-24.21	21.98
Cyclical Consumer Goods	-4.84	19.54	-0.25	0.08	-4.22	-2.18	15.74	10.26	16.65	0.62	3.27	9.96	10.28	14.45	-7.56	22.90	-0.33	-5.44	-6.38	-3.89	18.38
Non-Cyclical Consumer Goods	5.83	21.13	0.28	8.50	8.39	9.24	15.67	4.78	15.22	0.31	1.33	4.16	3.39	10.89	3.95	23.17	0.17	5.39	6.69	7.27	17.31
Cyclical Services	-1.86	17.87	-0.10	-3.35	-2.17	-2.48	15.77	6.11	11.58	0.53	6.62	6.43	7.13	9.79	-4.47	19.31	-0.23	-2.84	-4.73	-4.37	18.01
Non-Cyclical Services	16.96	36.04	0.47	-3.37	5.68	5.83	16.06	3.60	17.77	0.20	2.84	5.19	4.50	11.76	14.96	35.04	0.43	-2.03	3.91	3.71	16.90
Utilities	1.74	23.83	0.07	1.25	2.07	1.00	19.08	9.93	17.36	0.57	5.04	9.98	10.32	15.49	-0.98	24.40	-0.04	2.59	-0.31	-1.39	18.69
Financials	3.68	17.61	0.21	5.78	3.95	5.29	14.78	-13.51	21.75	-0.62	-13.36	-11.15	-10.75	13.78	1.85	17.87	0.10	4.01	1.98	3.26	14.03
Information Technology	-14.32	28.78	-0.50	-16.15	-13.12	-13.99	20.88	-16.82	35.23	-0.48	-29.37	-23.59	-23.90	25.03	-15.40	33.49	-0.46	-17.01	-14.07	-13.91	25.11
Avg. Abs. Industry Effect Across Sectors	**7.92**	**23.66**	**0.30**	**7.28**	**6.90**	**7.20**	**16.95**	**9.69**	**20.03**	**0.47**	**9.04**	**10.02**	**9.77**	**14.78**	**7.79**	**24.76**	**0.28**	**6.46**	**6.66**	**6.77**	**17.96**

Panel B: "Pure" Country Factors

Group	Sub-group	Country	All Sample Markets: Mean	Stdev	Sharpe Ratio	Median	Trimmed Mean (1%)	Trimmed Mean (5%)	Median Abs. Deviations	Developed (Emerging) Markets Only: Mean	Stdev	Sharpe Ratio	Median	Trimmed Mean (1%)	Trimmed Mean (5%)	Median Abs. Deviations
DSM	G7	Canada	4.36	17.83	0.24	4.12	5.01	4.45	16.23	1.75	16.42	0.11	2.05	2.15	2.22	16.14
		United States	4.42	7.36	0.60	5.35	4.72	5.25	6.96	2.79	7.30	0.38	-0.64	2.76	2.91	6.69
		France	3.34	17.74	0.19	7.05	3.22	2.54	13.70	5.73	17.55	0.33	6.14	5.73	5.77	12.76
		Germany	-2.85	25.49	-0.11	10.12	2.13	1.74	17.86	2.00	23.89	0.08	7.82	6.66	6.64	17.58
		United Kingdom	6.15	32.01	0.19	-10.87	5.15	4.35	26.64	9.29	32.58	0.29	1.16	9.98	7.51	25.07
		Italy	1.10	24.89	0.04	3.85	2.53	2.91	22.43	-3.30	23.56	-0.14	-1.80	-1.81	-1.36	20.18
		Japan	-10.21	24.93	-0.41	-18.74	-11.90	-11.12	21.63	-9.66	23.87	-0.40	-12.86	-8.85	-8.56	19.08
	Asia/ Australasia	Australia	7.29	23.20	0.31	6.99	6.54	8.12	20.91	1.30	22.13	0.06	14.69	0.93	2.82	19.28
		New Zealand	10.35	22.23	0.47	13.55	9.78	10.75	20.03	10.61	21.33	0.50	10.34	10.01	10.74	19.49
		Hong Kong/China	-17.93	49.51	-0.36	-11.94	-19.55	-15.28	26.09	-27.70	46.63	-0.59	-11.08	-28.85	-22.61	21.49
		Singapore	-4.16	46.30	-0.09	-7.38	-11.99	-13.12	31.72	-3.69	35.32	-0.10	-4.43	-5.75	-5.47	25.26
	Group Avg. Abs. Country Effect		***6.56***	***26.46***	***0.27***	***9.09***	***7.50***	***7.24***	***20.38***	***7.07***	***24.60***	***0.27***	***6.64***	***7.59***	***6.97***	***18.46***
ESM	Advanced	Brazil	-43.34	60.57	-0.72	-23.19	-38.11	-36.44	38.47	-27.94	52.62	-0.53	-10.81	-22.91	-16.48	29.45
		Mexico	-15.74	42.89	-0.37	-21.56	-12.72	-11.70	32.33	-0.97	39.25	-0.02	3.84	1.87	3.64	29.44
		Israel	-4.20	29.19	-0.14	-1.14	-4.43	-3.84	24.47	9.99	33.49	0.30	18.28	11.93	15.66	27.98
		Korea	10.58	78.11	0.14	-8.74	-8.03	-11.98	37.57	25.20	67.85	0.37	9.20	10.13	4.34	35.17
		Taiwan/China	-15.62	34.28	-0.46	-17.74	-15.13	-15.71	29.01	-1.28	34.11	-0.04	10.18	2.40	3.16	26.43
		South Africa	-6.69	31.20	-0.21	-4.70	-7.64	-5.75	26.22	7.60	29.34	0.26	9.02	9.48	8.73	22.66
	Asia	India	3.51	49.86	0.07	-10.47	-11.17	-13.64	31.83	18.18	49.93	0.36	6.59	6.50	4.25	33.32
		Pakistan	-11.91	43.18	-0.28	-8.83	-10.63	-10.24	37.98	2.51	42.88	0.06	1.27	2.44	2.81	36.45
		China	-4.23	39.20	-0.11	-2.54	-4.79	-5.58	31.79	10.03	41.66	0.24	-0.73	11.78	12.23	33.48
		Indonesia	-47.72	98.88	-0.48	-15.35	-58.07	-43.01	50.27	-33.27	92.73	-0.36	-10.94	-42.76	-30.95	52.79
		Malaysia	-5.21	42.27	-0.12	-11.75	-5.44	-9.53	29.10	9.50	39.14	0.24	4.58	10.28	6.67	26.59
		Philippines	-62.36	67.46	-0.92	-66.50	-65.40	-69.89	43.42	-47.70	62.50	-0.76	-41.28	-49.25	-58.03	41.80
		Thailand	-9.85	48.29	-0.20	-13.88	-13.35	-12.08	35.34	5.39	44.95	0.12	8.63	2.20	4.77	34.08
	Europe	Czech Republic	-5.91	31.02	-0.19	-2.43	-6.15	-8.24	30.14	8.47	33.60	0.25	4.93	11.00	10.12	29.80
		Hungary	-11.10	38.20	-0.29	0.69	-7.61	-0.46	30.54	2.63	40.81	0.06	14.75	6.85	15.01	31.00
		Poland	-13.99	42.83	-0.33	-11.43	-12.94	-9.87	32.62	0.57	45.06	0.01	8.12	3.89	8.32	34.40
		Turkey	-5.47	65.44	-0.08	8.83	-5.37	0.86	50.78	8.78	66.28	0.13	26.27	11.17	20.86	47.13
		Russia	19.54	95.04	0.21	25.36	20.60	21.34	52.61	35.05	91.73	0.38	26.38	36.14	39.00	51.55
	Lat. America	Argentina	-17.48	46.89	-0.37	-26.17	-16.04	-16.45	37.49	-2.70	44.86	-0.06	-11.35	-0.37	-2.46	37.28
		Chile	-4.71	30.77	-0.15	-13.88	-8.76	-10.61	23.36	9.92	32.28	0.31	-8.77	9.19	8.51	22.06
		Colombia	-22.21	42.25	-0.53	-22.02	-24.04	-25.98	33.51	-7.65	43.53	-0.18	-12.84	-8.26	-6.64	33.78
		Peru	8.40	28.95	0.29	1.35	9.50	9.25	25.35	23.31	30.38	0.77	16.47	26.39	27.41	25.45
	Group Avg. Abs. Country Effect		***15.90***	***49.40***	***0.30***	***14.48***	***16.63***	***16.02***	***34.74***	***13.57***	***48.14***	***0.26***	***12.06***	***13.51***	***14.09***	***33.75***
Avg. Abs. Country Effect Across All Markets			**12.79**	**41.77**	**0.29**	**12.68**	**13.59**	**13.09**	**29.93**	-	-	-	-	-	-	-

The first row in Panel A summarizes the world benchmark returns (the intercepts) estimated from the three country samples. Evaluated over the full sample period, means and three robust measures of location for the "emerging" and "developed" samples are both negatively signed, with the exception for the median of the "emerging" sample—about 0.63 percent p.a. In contrast, all measures of location for the "all" sample are unanimously positive. The world benchmark return estimated from the "emerging" sample shows a relatively unimpressive performance (negative return) during the sample period, which is about four times, in absolute value, of the one estimated from the "developed" sample. On the other hand, two dispersion measures—standard deviation and MAD—of the world benchmark return of the "all" sample are almost identical to those of the "developed" sample; but they are much smaller than those of the "emerging" sample. If the estimated world benchmark return (the intercept) is assumed to be a cross-sectional sum of a common component representative of a true world factor and a variable component unique to the countries included in a given sample, the disparate performances of the world benchmark portfolio in "all," "developed" and "emerging" samples provide a weak support for the international portfolio diversification argument. That is, the potential gains are relative large for a portfolio that is diversified across developed and emerging markets. As can be seen from the first row of Panel A, with a portfolio of developed and emerging markets, it will produce the maximum gains, about 0.2 percent p.a. for the risk-adjusted return (Sharpe ratio), better than a diversification strategy within "developed" sample (-0.18 percent p.a.) or within "emerging" sample (-0.36 percent p.a.) alone. Similar results are also obtained from the world benchmark return estimated from industry returns of 39 FTSE Industry Sector (see Appendix C.1).

The rest rows of Panel A and Panel B summarize the performances of industry and country factors respectively during 1994-2003. When comparing the estimated industry factors across different country samples, one of the striking features in Panel A is that industries in developed markets earn much higher mean returns than their emerging market counterparts. However, the difference in standard deviations between "developed" and "emerging" samples is not very big, on average about 4.73 percent p.a. This evidence indicates that industries in both developed and emerging markets are quite volatile during 1994-2003. The robust measures also unveil the similar results but smaller in their absolute magnitudes than means and standard deviations, suggesting the possible presence of outliers in the estimates.

In Panel A, the statistics under "Emerging Markets Only" show that most industries in emerging markets have under-performed their world benchmark return: Most of them have negatively signed means, medians and trimmed means. In contrast, statistics under "Developed Market Only" illustrate that most industries in developed markets have outperformed their world benchmark portfolio: Most of industries have positively signed mean returns, so do other measures of location. The only two industries with negative statistics are the "Financials" and the "Information Technology" (IT), with their average returns being -13.51 percent p.a. and -16.82 percent p.a., respectively. For the "IT," the underperformance exacerbates when measured in medians (trimmed means), around -29.37 percent (-23.60 percent) p.a., which is much lower than other industries in the same column. Further, the "IT" also has the highest standard deviation (MAD) among all industries, about 35.23 percent (25.03 percent) p.a. A similar story also takes place in emerging markets in the "emerging" sample, with the "IT" owns the highest standard deviation (MAD) of 33.49 percent (25.11 percent) p.a. This evidence may reflect the abnormal performance of the "IT" in most countries during 1994-2003, which, as argued by Brooks and Catao (2000), may strengthen the links between markets. Interestingly, when both developed and emerging markets are considered together, the statistics under "All Sample Markets" indicate that the "IT" has yielded to the "Non-Cyclical Services," which has the standard deviation of 36.04 percent p.a., though robust MADs still suggest that the "IT" is still a volatile industry relative to others. When averaged across all ten FTSE Economic Groups, two volatility measures for all three country samples are not very different from each other, with standard deviations (MADs) being 23.66 percent (16.95 percent) p.a. for the "all" sample, 20.03 percent (14.78 percent) p.a. for "developed" sample, and 24.76 percent (17.69 percent) p.a. for "emerging" sample, respectively.

On the other hand, in Panel B, the summary statistics for the estimated country factors under "All Sample Markets" show that most emerging markets exhibit lower average returns and higher volatilities than their developed counterparts. Exceptions include Hong Kong/China and Singapore, which have the highest volatilities among all developed markets with their standard deviations (MADs) being 49.51 percent (26.09 percent) p.a. and 46.30 percent (31.72 percent) p.a., respectively. The high volatility for these two developed markets may be largely due to the Asian Financial Crisis, during which both Hong Kong/China and Singapore were badly hit by the instability of the regional economy. Several emerging markets in "Asia" and "Europe," which were also heavily hit by the Asian Financial Crisis, also exhibit the similar pattern in their respective market returns and volatilities. For example, the Philippines has worst performance among all emerging markets, with average return of -62.36 percent p.a., followed by Indonesia, about -47.72 percent p.a. When the country factors for each market are measured in standard deviations, Indonesia has the highest volatility, about 98.88 percent p.a., followed by Russia, about 96.04 percent p.a. Both of them also have the highest MAD measures among all 33 markets, about 50.27 and 52.61 percent p.a., respectively. The three robust measures of location also produce the same results. When estimated separately for two country samples as under "Developed/Emerging Markets Only," summary statistics once again confirm the above empirical results: Crisis-stricken markets own the highest volatility measures with each country sample and some of them have significantly under-performed their respective world benchmark portfolio.

In sum, the summary statistics in both panels of Table 5.2 have shown that on average, the volatilities of the country factors are higher than these of the industry factors. This phenomenon is much more pronounced in the "emerging" sample, in which average standard deviations (MADs) of the country factor are more than twice the average standard deviations (MADs) of the industry factor. In contrast, the country factor of the "developed" sample has the similar average volatility as its industry factor. On the other hand, the means, medians and trimmed means of the country factor in developed markets are more homogenous than their emerging counterparts, especially among G7 countries. (Japan is the only exception. It has consistently underperformed the world benchmark portfolio in both "all" sample and "developed" sample during 1994-2003.) By contrast, industries have exhibited heterogeneous performances in the three country samples.

In order to make the summary statistics in two panels of Table 5.2 directly comparable to each other, following the suggestion by Heston and Rouwenhorst (1995), cross-industry (country) average absolute values of means and three robust measure of location across the markets in "all," "emerging" and "developed" samples are computed and thereby compared with each other. Heston and Rouwenhorst (1995) interpret these average absolute values as the opportunity costs for those portfolio managers without tilting their portfolios towards a specific industry (country), when country (industry) composition is held fixed. The computed statistics are provided for each FTSE Economic Group in the last row of Panel A and each Country Group in Panel B.

Under "All Sample Markets," the average absolute country factor is much larger than its industry factor counterpart in Panel A. On average, the country factor is about twice the size of industry factor. A closer look at Panel B of Table 5.2 reveals that emerging markets contribute more to the average absolute country factor than developed markets. The country factor of developed markets is almost identical in its magnitude to their average industry factor. Analogous results are also obtained from "developed" and "emerging" samples. These results are also robust to a finer version of industry classification (see Appendix C.1).

Two regularities emerge from the above analysis. First, average absolute country factor, when estimated from a country group including emerging markets, is larger than average absolute industry factor. This evidence implies that the country factor may be more important in emerging markets than in developed markets. For portfolio managers, this fact suggests that a deviation of portfolio from the country composition of the world benchmark towards emerging markets while keeping the industry composition intact produces much bigger diversification benefits (in terms of average portfolio returns) than a tilt towards an industry, holding the country composition fixed. This is consistent with previous studies on emerging markets that a diversification strategy across developed and emerging markets exploits more benefits than a diversification strategy within developed markets. Second, when developed markets are considered alone, the country factor is almost identical to the industry factor; for some industries, their corresponding industry factors even dominate country factors. This evidence suggests that an industrially-diversified portfolio among developed markets may generate more diversification benefits then a portfolio diversified across developed markets.

Unfortunately, since the estimates obtained from different country grouping strategies are measured against different world benchmark portfolios, the statistics presented in Table 5.2 also not directly comparable across samples. For example, the estimated world benchmark return for a group of emerging markets may contain a component specific to those emerging markets. (This is confirmed by the inconsistent summary statistics for the world benchmark returns across three country samples in the first row of Panel A in Table 5.2.) As a result, the estimation results for the industry and country factors presented in columns under "Emerging Markets Only" may be biased downwards relative to a true world benchmark portfolio is used. Therefore, the following section will provide an analysis based on the proportions of excess market volatilities that can be explained by industry and country factors.

5.2.3 Variance Ratio Analysis

As demonstrated in Heston and Rouwenhorst (1994), their dummy variable regression model can exactly express an excess cross-sectional market return above the world benchmark return (the intercept) as a sum of a pure country factor and a value-weighted industry factor that are aggregated from the estimated industry factors for all industries available in that market. Analogously, an excess cross-sectional industry return above the same world benchmark return can also be exactly expressed as a sum of a pure industry factor and a value-weighted country factor aggregated from the estimated country factors for all markets possessing that industry. Further, since each factor is orthogonal to each other and the cross-sectional betas are assumed to be unit for each factor throughout the sample period, the marginal explanatory power of each factor can be roughly measured by the factor variances. Notably, the sum of the variance ratios of industry and country factors is not necessarily equal to one in a market because they are computed from time-series data.

Table 5.3

Decomposition of U.S. Dollar-Denominated Excess Index Returns into Industry and Country Factors Using Ten Broad FTSE Economic Group Classification System (January 1994 – June 2003)

This table presents the standard deviations (expressed in percentage per week) and variance ratios of the industry and country components of U.S. dollar-denominated, value-weighted excess industry (10 FTSE Economic Groups) and country index returns over a value-weighted world benchmark return during the full sample period, i.e. from January 1994 through June 2003. Continuously compounded raw returns for each sector are measured at a weekly frequency (Wednesday-to-Wednesday). In Panel A, each excess industry return is decomposed into a pure industry factor, and a value-weighted sum of country factors, estimated from a dummy variable regression model of Heston and Rouwenhorst (1994). The standard deviations are computed for each component. The variance ratio relative to the market gives the ratio of the variance of that component to the variance of index return in excess of the value-weighted benchmark world. In a similar fashion, in Panel B, each excess country return is also decomposed into a pure country factor and a value-weighted sum of industry factors classified by the ten broad FTSE Economic Groups. In each panel, along with the sample standard deviations and variance ratios for industry and country factors estimated from all 33 markets (under column titled as "All Sample Markets"), sample countries are further categorized into two groups according to the maturity of the market. That is, "DSM" group, which is composed of 11 developed stock markets; and, "ESM" group, which is composed of 22 emerging stock markets. Under column "Developed (Emerging) Markets Only," standard deviations and variance ratios are also provided for industry and country factors estimated independently from those two groups as a comparison. Cross-country and cross-industry means (medians) are computed as arithmetic averages (medians) of respective factors across countries and 10 FTSE Economic Groups.

Panel A: Decomposition of Industry Index Returns

FTSE Economic Group		All Sample Markets				Developed Markets Only (DSM)				Emerging Markets Only (ESM)			
		Cumulative Country Factor		Pure Industry Factor		Cumulative Country Factor		Pure Industry Factor		Cumulative Country Factor		Pure Industry Factor	
		Stdev (%)	Var. Ratio	Stdev (%)	Var. Ratio	Stdev (%)	Var. Ratio	Stdev (%)	Var. Ratio	Stdev (%)	Var. Ratio	Stdev (%)	Var. Ratio
Resources		0.76	0.13	3.23	2.34	0.74	0.10	4.07	3.01	2.47	0.52	2.99	0.76
Basic Industries		0.59	0.16	2.71	3.25	0.58	0.15	2.86	3.71	1.10	0.13	2.75	0.78
General Industries		0.57	0.15	4.02	7.42	0.46	0.11	2.04	2.13	4.69	2.22	4.17	1.75
Cyclical Consumer Goods		1.44	0.65	2.71	2.29	1.35	0.62	2.31	1.79	3.32	1.04	3.18	0.95
Non-Cyclical Consumer Goods		0.44	0.04	2.93	1.96	0.43	0.04	2.11	0.94	1.69	0.22	3.21	0.79
Cyclical Services		0.24	0.03	2.48	2.74	0.21	0.02	1.61	1.16	2.15	0.47	2.68	0.73
Non-Cyclical Services		0.48	0.05	5.00	5.53	0.46	0.05	2.46	1.50	2.40	0.50	4.86	2.06
Utilities		0.35	0.03	3.31	2.96	0.35	0.03	2.41	1.38	2.04	0.34	3.38	0.93
Financials		0.30	0.03	2.44	2.03	0.31	0.03	3.02	3.22	0.99	0.09	2.48	0.57
Information Technology		0.66	0.04	3.99	1.37	0.68	0.04	4.89	2.13	4.01	0.89	4.64	1.19
Cross-Industry	**Mean**	**0.58**	**0.13**	**3.28**	**3.19**	**0.56**	**0.12**	**2.78**	**2.10**	**2.49**	**0.64**	**3.43**	**1.05**
	Median	**0.53**	**0.05**	**3.08**	**2.54**	**0.46**	**0.05**	**2.44**	**1.96**	**2.27**	**0.48**	**3.19**	**0.86**

Panel B: Decomposition of Country Index Returns

Group	Sub-group	Country	All Sample Markets				Developed Markets Only (DSM)				Emerging Markets Only (ESM)			
			Pure Country Factor		Cumulative Industry Factor		Pure Country Factor		Cumulative Industry Factor		Pure Country Factor		Cumulative Industry Factor	
			Stdev (%)	Var. Ratio	Stdev (%)	Var. Ratio	Stdev (%)	Var. Ratio	Stdev (%)	Var. Ratio	Stdev (%)	Var. Ratio	Std. Dev.	Var. Ratio
DSM	G7	Canada	2.47	1.34	0.71	0.11	2.28	1.11	0.84	0.15	-	-	-	-
		United States	1.02	0.38	0.38	0.05	1.01	0.37	0.35	0.04	-	-	-	-
		France	2.46	1.19	0.42	0.03	2.43	1.12	0.47	0.04	-	-	-	-
		Germany	3.54	2.12	1.01	0.17	3.31	1.91	0.88	0.13	-	-	-	-
		United Kingdom	4.44	5.06	0.79	0.16	4.52	5.15	0.87	0.19	-	-	-	-
		Italy	3.45	1.26	1.45	0.22	3.27	1.16	1.30	0.18	-	-	-	-
		Japan	3.46	1.41	0.54	0.03	3.31	1.36	0.48	0.03	-	-	-	-
		Sub-group Avg.	*2.98*	*1.82*	*0.76*	*0.11*	*2.88*	*1.74*	*0.74*	*0.11*	-	-	-	-
	Asia/ Australasia	Australia	3.22	1.89	1.09	0.22	3.07	1.66	1.51	0.40	-	-	-	-
		New Zealand	3.08	1.07	1.97	0.44	2.96	0.93	1.34	0.19	-	-	-	-
		Hong Kong/China	6.87	3.84	1.36	0.15	6.47	3.36	1.08	0.09	-	-	-	-
		Singapore	6.42	2.78	1.05	0.07	4.90	1.60	1.27	0.11	-	-	-	-
		Sub-group Avg.	*4.90*	*2.39*	*1.37*	*0.22*	*4.35*	*1.89*	*1.30*	*0.20*	-	-	-	-
	Group	***Mean***	***3.67***	***2.03***	***0.98***	***0.15***	***3.41***	***1.79***	***0.94***	***0.14***	-	-	-	-
		Median	***3.45***	***1.41***	***1.01***	***0.15***	***3.27***	***1.36***	***0.88***	***0.13***	-	-	-	-
ESM	Advanced	Brazil	8.40	2.13	1.56	0.07	-	-	-	-	7.30	1.95	1.19	0.05
		Mexico	5.95	1.62	2.01	0.19	-	-	-	-	5.44	1.55	1.89	0.19
		Israel	4.05	1.25	0.84	0.05	-	-	-	-	4.64	1.27	1.10	0.07
		Korea	10.83	3.57	1.53	0.07	-	-	-	-	9.41	2.84	1.53	0.08
		Taiwan/China	4.75	1.21	1.79	0.17	-	-	-	-	4.73	1.23	2.09	0.24
		South Africa	4.33	1.61	1.34	0.16	-	-	-	-	4.07	1.39	1.10	0.10
		Sub-group Avg.	*6.38*	*1.90*	*1.51*	*0.12*					*5.93*	*1.71*	*1.48*	0.12
	Asia	India	6.92	2.78	0.93	0.05	-	-	-	-	6.93	2.29	1.12	0.06
		Pakistan	5.99	1.08	1.63	0.08	-	-	-	-	5.95	1.07	1.35	0.06
		China	5.44	1.09	0.95	0.03	-	-	-	-	5.78	1.11	1.10	0.04
		Indonesia	13.71	2.85	1.82	0.05	-	-	-	-	12.86	2.80	1.76	0.05
		Malaysia	5.86	1.29	0.86	0.03	-	-	-	-	5.43	1.35	0.91	0.04
		Philippines	9.35	3.10	1.19	0.05	-	-	-	-	8.67	2.99	1.13	0.05
		Thailand	6.70	0.94	1.22	0.03	-	-	-	-	6.23	0.96	1.11	0.03
		Sub-group Avg.	*7.71*	*1.87*	*1.23*	*0.05*					*7.41*	*1.80*	*1.21*	*0.05*
	Europe	Czech Republic	4.30	1.09	2.26	0.30	-	-	-	-	4.66	1.06	2.01	0.20
		Hungary	5.30	1.53	1.64	0.15	-	-	-	-	5.66	1.48	1.31	0.08
		Poland	5.94	1.30	1.37	0.07	-	-	-	-	6.25	1.35	1.39	0.07
		Turkey	9.08	1.26	1.05	0.02	-	-	-	-	9.20	1.26	1.20	0.02
		Russia	13.18	2.22	2.32	0.07	-	-	-	-	12.72	2.40	2.12	0.07
		Sub-group Avg.	*7.56*	*1.48*	*1.73*	*0.12*					7.70	*1.51*	*1.60*	*0.09*
	Lat. America	Argentina	6.50	1.47	1.91	0.13	-	-	-	-	6.22	1.53	1.57	0.10
		Chile	4.27	1.55	1.65	0.23	-	-	-	-	4.48	1.47	1.47	0.16
		Colombia	5.86	1.59	1.28	0.08	-	-	-	-	6.04	1.47	1.44	0.08
		Peru	4.02	0.86	1.70	0.15	-	-	-	-	4.21	0.89	1.54	0.12
		Sub-group Avg.	*5.16*	*1.37*	*1.63*	*0.15*	-	-	-	-	*5.24*	*1.34*	*1.51*	*0.11*
	Group	***Mean***	***6.85***	***1.70***	***1.49***	***0.10***	-	-	-	-	***6.72***	***1.63***	***1.43***	***0.09***
		Median	***5.94***	***1.50***	***1.54***	***0.07***	-	-	-	-	***5.99***	***1.43***	***1.37***	***0.07***
Cross-Country		**Mean**	**5.79**	**1.81**	**1.32**	**0.12**	-	-	-	-	-	-	-	-
		Median	**5.44**	**1.47**	**1.34**	**0.08**	-	-	-	-	-	-	-	-

Table 5.3 provides the decomposition results under ten broad FTSE Economic Groups. Panel A reports standard deviations, in percentage per week, and the variance ratios of the pure industry factor, as well as the value-weighted cumulative country factor, to the excess industry returns on ten FTSE Economic Groups. As a robust check, the decomposition results are also reported for a sub-sample consisting of 11 developed markets ("developed" sample) and a sub-sample of 22 emerging markets ("emerging" sample).

Panel A of Table 5.3 shows that most of the variation in the excess value-weighted global industry returns can be attributed to the pure industry factor, especially in the country samples that include developed markets. For example, when all 33 markets are considered together, the average variance ratio of the industry factor therein is about 3.19, followed by 2.10 in the "developed" sample. For "emerging" sample, the average variance ratio of the industry factor is only about 1.05, which is about the half of that of "developed" sample and one third of that of the "all" sample. By contrast, average variance ratios of the (cumulative) country factor for all three country samples are only about 0.13 ("all" sample), 0.12 ("developed" sample) and 0.64 ("emerging" sample), respectively. Among them, "emerging" sample has the highest (cumulative) variance ratio for the country factor relative to others, which suggests the strong presence of the country factor in emerging markets.

Panel B reports the same measure but for the decomposition results of excess value-weighted market returns. The average variance ratios of the pure country factor for three country samples are about 1.83 ('all" sample), 1.79 ("developed" sample), and 1.63 ("emerging" sample), respectively. Notably, these average variance ratios are quite homogenous across the three country samples. Under "All Sample Markets," a closer look at the variance ratio of the country factor for each market reveals that the U.S. has the smallest variance ratio for its country factor, about 0.38, whereas the U.K. has the highest, about 5.06, followed by Germany (2.21). Previous studies conclude that developed markets are more integrated with the world capital market than their emerging counterparts. Thereby, it is surprising to see that the U.K. has the highest variance ratio for its country factor among all 33 countries and this empirical result is quite robust when countries are further divided into two sub-samples, in which case the variance ratio for the country factor of the U.K. in the "developed" sample is still as high as 5.12. As expected, for those countries having undergone financial crises during the sample period, they have relatively higher proportions of their respective excess country returns explained by the pure country factor: Korea (3.57), Hong Kong/China (3.84), Singapore (2.78), Indonesia (2.85) and the Philippines (3.10), for the Asian Financial Crisis of 1997; Russia (2.22), for the Default Risk in 1998; Brazil (2.22) and Mexico (1.62), for the Mexican Tequila Crisis in 1995. This empirical evidence is also robust when each factor is extracted from a sub-sample consisting of 22 emerging markets (see columns under "Emerging Markets Only").

In Panel B, the average variance ratios of the cumulative industry factor are about 0.12, 0.14, and 0.09 for "all," "developed" and "emerging" samples, respectively. Under "All Sample Markets," the variance ratios of the (cumulative) industry factor reveal that New Zealand has the highest variance ratio, about 0.44. However, when all eleven developed markets are considered alone, New Zealand concedes to Australia whose industrial variance ratio is about 0.41.

When considered as country sub-groups, "Asia/Australasia" has the highest country (2.03) and industry variance ratios (0.15). "Asia," however, has the lowest industry variance ratio of 0.05. (Similar results are also obtained in two sub-samples of countries.) Furthermore, when examining the distribution of emerging market countries with relatively high country variance ratios, Panel B discloses that the regional factor may have some impact on their respective market performances.

When both panels of Table 5.3 are examined together, an interesting picture emerges. Under "All Sample Markets," cross-industry/country averages of standard deviations reveal that the volatility of the pure industry factor (3.28 percent per week) is smaller than the pure country factor (5.75 percent per week), which indicates that the country factor may be important in explaining the variation in international security returns.

Griffin and Karolyi (1998) argue that the relative importance of industry and country factors in determining market performance is sensitive to the industry classification system. In particular, an industry classification as broad as ten FTSE Economic Groups may mask industry factors in that the constituent stocks in each broad industry may not perform in a homogenous and consistent way as they do when aggregated into a finer industry classification. Hence, it seems too early to draw a conclusion directly based on the analysis on a broad industry classification without a further analysis implemented on a refined version. Table 5.4 also presents the decomposition results on a more finely-partitioned 39 FTSE Industry Sectors.

As can be seen from Panel A of Table 5.4, the standard deviations of pure industry factor are larger, about 1 percent per week on average, than those calculated from the broad industry classification system. For "all," "developed" and "emerging" samples, standard deviations are about 4.11, 3.58, and 4.72 percent per week, respectively. Similar results are also obtained for the cumulative country factor in each industry. For "all" and "developed" samples, the discrepancy between two industry classification systems is about 0.5 percent per week; whereas for "emerging" sample, this discrepancy has increased, about 1 percent per week. These results are consistent with the empirical findings in Griffin and Karolyi (1998) that the increase in the importance of the industry factor occurs when a finer industry classification system is used, but the empirical results in this study are not as extreme as theirs. When examined in terms of average industrial variance ratios, the difference between two industry classification systems becomes even smaller for "all" and "developed" samples: The industrial variance ratios are almost identical to each other (39 FTSE Industry Sectors versus 10 FTSE Economic Groups): 3.21 versus 3.19 and 2.13 versus 2.10. On the other hand, the cumulative country variance ratios for 39 finely partitioned industries are, on average, about twice the size of those estimated from the broad version. This evidence may be attributed to the fact that country concentration phenomenon is more pronounced in the finer version of industry classification than the broad one. This inconsistency becomes more prominent for "emerging" sample, in which pure industrial and cumulative country variance ratios are much bigger with a ratio about 2 : 1 (finer versus broad industry classification).

Table 5.4

Decomposition of U.S. Dollar-Denominated Excess Index Returns into Industry and Country Factors Using 39 Finer FTSE Industry Sector Classification System (January1994 – June 2003)

This table presents the standard deviations (expressed in percentage per week) and variance ratios of the industry and country components of U.S. dollar-denominated, value-weighted excess industry (39 FTSE Industry Sectors) and country index returns over a value-weighted world benchmark return during the full sample period, i.e. from January 1994 through June 2003. Continuously compounded raw returns for each sector are measured at a weekly frequency (Wednesday-to-Wednesday). In Panel A, each excess industry return is decomposed into a pure industry factor, and a value-weighted sum of country factors, estimated from a dummy variable regression model of Heston and Rouwenhorst (1994). The standard deviations are computed for each component. The variance ratio relative to the market gives the ratio of the variance of that component to the variance of index return in excess of the value-weighted benchmark world. In a similar fashion, in Panel B, each excess country return is also decomposed into a pure country factor and a value-weighted sum of industry factors classified by the ten broad FTSE Industry Sectors. In each panel, along with the sample standard deviations and variance ratios for industry and country factors estimated from all 33 markets (under column titled as "All Sample Markets"), sample countries are further categorized into two groups according to the maturity of the market. That is, "DSM" group, which is composed of 11 developed stock markets; and, "ESM" group, which is composed of 22 emerging stock markets. Under column "Developed (Emerging) Markets Only," standard deviations and variance ratios are also provided for industry and country factors estimated independently from these two groups as a comparison. Cross-country and cross-industry means (medians) are computed as arithmetic averages (medians) of respective factors across countries and 39 FTSE Industry Sectors.

Panel A: Decomposition of Industry Index Returns

Economic Group	Industry Sector (FTSE Sector)	All Sample Markets: Cumulative Country Factor Stdev (%)	All Sample Markets: Cumulative Country Factor Var. Ratio	All Sample Markets: Pure Industry Factor Stdev (%)	All Sample Markets: Pure Industry Factor Var. Ratio	DSM: Cumulative Country Factor Stdev (%)	DSM: Cumulative Country Factor Var. Ratio	DSM: Pure Industry Factor Stdev (%)	DSM: Pure Industry Factor Var. Ratio	ESM: Cumulative Country Factor Stdev (%)	ESM: Cumulative Country Factor Var. Ratio	ESM: Pure Industry Factor Stdev (%)	ESM: Pure Industry Factor Var. Ratio
Resource	Mining	1.89	0.43	5.53	3.64	1.79	0.33	4.15	1.79	2.95	0.85	5.08	2.52
	Oil & Gas	0.69	0.07	3.79	2.25	0.79	0.09	4.01	2.37	2.33	0.48	3.94	1.36
Basic Industries	Chemicals	0.53	0.08	3.11	2.80	0.48	0.05	3.02	2.04	2.89	0.98	3.41	1.36
	Construction & Building Materials	1.27	0.41	3.32	2.83	1.40	0.40	3.25	2.14	2.05	0.51	3.52	1.50
	Forestry & Paper Products	0.62	0.07	3.97	2.84	0.52	0.04	3.18	1.49	2.04	0.41	4.34	1.86
	Steel & Other Metals	1.08	0.20	4.28	3.16	1.12	0.17	5.03	3.49	1.64	0.27	4.27	1.85
General Industries	Aerospace & Defence	0.94	0.15	4.02	2.76	1.30	0.23	5.19	3.76	5.20	2.11	4.58	1.63
	Diversified Industrials	1.02	0.25	3.73	3.37	0.97	0.20	2.07	0.89	1.96	0.42	4.17	1.89
	Electronic & Electrical Equipment	1.35	0.35	3.61	2.52	1.10	0.23	3.60	2.53	5.48	3.37	4.18	1.96
	Engineering & Machinery	0.81	0.20	4.81	7.02	0.81	0.15	3.19	2.34	3.80	1.64	5.34	3.25
Cyclical Consumer Goods	Automobiles and Parts	1.29	0.35	3.44	2.48	1.22	0.27	4.25	3.28	3.85	1.55	3.91	1.60
	Household Goods & Textiles	1.53	0.40	3.39	1.97	1.48	0.36	3.29	1.77	3.46	1.17	3.97	1.54
Non-Cyclical Consumer Goods	Beverages	0.56	0.05	2.84	1.18	0.51	0.03	2.90	1.10	2.72	0.61	3.05	0.77
	Food Producers & Processors	0.36	0.03	3.15	2.01	0.36	0.02	3.61	2.35	1.83	0.32	3.24	1.00
	Health	1.12	0.18	3.16	1.42	1.51	0.30	2.83	1.06	3.46	0.96	5.93	2.83
	Packaging	0.51	0.06	3.80	3.49	0.48	0.04	3.48	2.28	3.05	1.02	4.68	2.40
	Personal Care & Household Products	0.65	0.06	3.48	1.67	0.88	0.10	2.99	1.13	5.37	2.20	5.30	2.14
	Pharmaceuticals	0.43	0.03	5.54	4.53	0.49	0.03	3.20	1.44	3.58	0.94	6.35	2.95
	Tobacco	0.86	0.06	4.34	1.50	1.20	0.11	3.36	0.86	4.51	1.14	5.17	1.50
Cyclical Services	Distributors	1.50	0.41	5.81	6.14	1.50	0.36	3.33	1.78	6.15	3.57	7.64	5.51
	General Retailers	0.58	0.06	4.58	3.65	0.67	0.08	3.88	2.52	3.54	1.12	5.40	2.60
	Leisure, Entertainment & Hotels	0.86	0.14	4.38	3.55	0.62	0.07	2.63	1.19	4.28	1.92	5.25	2.89
	Media & Photography	0.42	0.04	4.95	5.27	0.43	0.04	2.70	1.65	4.42	2.21	5.52	3.45
	Support Services	0.70	0.10	4.51	4.14	0.77	0.11	4.59	3.92	4.27	1.90	7.43	5.78
	Transport	0.96	0.25	5.03	6.78	0.98	0.21	2.93	1.85	2.23	0.58	5.23	3.19
Non-Cyclical Services	Food & Drug Retailers	0.72	0.10	4.64	4.07	0.75	0.10	3.55	2.19	3.88	1.28	5.69	2.75
	Telecommunication Services	0.72	0.08	2.33	0.85	0.90	0.12	2.18	0.71	2.38	0.58	2.21	0.50
Utilities	Electricity	0.41	0.03	3.33	2.11	0.39	0.03	2.30	0.86	2.09	0.40	3.32	1.00
	Gas Distribution	0.51	0.04	4.17	2.66	0.52	0.04	2.39	0.83	3.92	1.25	4.65	1.76
	Water	2.98	0.63	4.61	1.52	2.83	0.55	4.29	1.26	4.31	0.95	6.05	1.86
	Utilities, Others	2.73	1.28	2.20	0.84	3.10	1.17	2.35	0.67	1.79	0.30	2.80	0.74
Financials	Banks	0.54	0.07	2.94	2.10	0.66	0.09	2.01	0.88	1.15	0.14	2.93	0.91
	Insurance	0.59	0.08	3.24	2.31	0.57	0.07	3.18	2.10	5.10	2.42	3.59	1.20
	Life Assurance	1.02	0.22	3.83	3.07	1.04	0.21	3.42	2.27	3.27	1.02	4.13	1.63
	Investment Companies	2.23	1.22	3.12	2.38	2.41	1.26	3.24	2.28	3.86	1.91	3.66	1.71
	Real Estate	2.31	0.77	9.97	14.25	2.27	0.62	10.05	12.08	4.59	2.41	8.87	9.01
	Speciality & Other Finance	0.72	0.09	4.00	2.75	0.73	0.08	3.82	2.27	2.62	0.58	4.35	1.60
Information Technology	Information Technology Hardware	0.64	0.03	3.96	1.07	0.61	0.03	5.59	2.14	4.45	1.08	4.60	1.15
	Software & Computer Services	1.01	0.08	5.47	2.26	1.49	0.17	4.43	1.49	3.77	0.84	6.28	2.33
Cross-Industry	**Mean**	**1.02**	**0.23**	**4.11**	**3.21**	**1.07**	**0.22**	**3.58**	**2.13**	**3.44**	**1.22**	**4.72**	**2.24**
	Median	**0.81**	**0.10**	**3.96**	**2.75**	**0.88**	**0.11**	**3.29**	**1.85**	**3.54**	**1.02**	**4.58**	**1.85**

DSM = Developed Markets Only (DSM); ESM = Emerging Markets Only (ESM)

Panel B: Decomposition of Country Index Return

Group	Sub-group	Country	All Sample Markets				Developed Markets Only (DSM)				Emerging Markets Only (ESM)			
			Pure Country Factor		Cumulative Industry Factor		Pure Country Factor		Cumulative Industry Factor		Pure Country Factor		Cumulative Industry Factor	
			Stdev (%)	Var. Ratio	Stdev (%)	Var. Ratio	Stdev (%)	Var. Ratio	Stdev (%)	Var. Ratio	Stdev (%)	Var. Ratio	Stdev (%)	Var. Ratio
DSM	*G7*	Canada	2.75	1.45	0.90	0.16	2.40	0.98	0.88	0.13	-	-	-	-
		United States	1.25	0.44	0.32	0.03	1.67	0.73	0.30	0.02	-	-	-	-
		France	2.87	1.44	0.60	0.06	2.45	1.07	0.57	0.06	-	-	-	-
		Germany	2.86	1.31	0.97	0.15	2.62	1.06	0.99	0.15	-	-	-	-
		United Kingdom	3.49	2.74	0.82	0.15	3.36	2.48	0.81	0.14	-	-	-	-
		Italy	3.15	1.01	1.09	0.12	3.17	1.03	1.03	0.11	-	-	-	-
		Japan	3.15	1.05	0.59	0.04	3.11	0.96	0.59	0.03	-	-	-	-
		Sub-group Avg.	*2.79*	*1.35*	*0.76*	*0.10*	*2.68*	*1.19*	*0.74*	*0.09*				
	Asia/ Australasia	Australia	3.99	2.87	1.50	0.41	3.31	1.91	1.38	0.33	-	-	-	-
		New Zealand	5.34	3.27	1.40	0.22	4.03	1.62	1.36	0.18	-	-	-	-
		Hong Kong/China	5.20	2.17	2.73	0.60	4.64	1.57	2.94	0.63	-	-	-	-
		Singapore	5.01	1.67	1.36	0.12	4.57	1.29	1.53	0.14	-	-	-	-
		Sub-group Avg.	*4.88*	*2.50*	*1.75*	*0.34*	*4.14*	*1.60*	*1.80*	*0.32*	-	-	-	-
	Group	***Mean***	***3.55***	***1.77***	***1.12***	***0.19***	***3.17***	***1.32***	***1.09***	***0.17***	-	-	-	-
		Median	***3.15***	***1.45***	***0.97***	***0.15***	***3.17***	***1.07***	***0.99***	***0.14***	-	-	-	-
ESM	*Advanced*	Brazil	7.12	1.58	1.44	0.06	-	-	-	-	6.14	1.49	1.06	0.04
		Mexico	5.85	1.57	1.25	0.07	-	-	-	-	5.06	1.51	1.19	0.08
		Israel	4.09	1.24	1.53	0.17	-	-	-	-	4.35	1.26	2.15	0.31
		Korea	8.61	2.23	1.39	0.06	-	-	-	-	7.86	2.09	1.67	0.09
		Taiwan/China	4.87	1.28	1.79	0.17	-	-	-	-	4.94	1.52	2.15	0.29
		South Africa	4.44	1.77	2.26	0.46	-	-	-	-	3.81	1.53	1.68	0.30
		Sub-group Avg.	*5.83*	*1.61*	*1.61*	*0.17*					*5.36*	*1.57*	*1.65*	0.19
	Asia	India	5.24	1.59	1.08	0.07	-	-	-	-	5.39	1.58	1.59	0.14
		Pakistan	6.08	1.11	1.49	0.07	-	-	-	-	5.81	1.11	1.48	0.07
		China	5.85	1.23	1.57	0.09	-	-	-	-	6.13	1.36	1.78	0.11
		Indonesia	11.33	2.00	1.95	0.06	-	-	-	-	10.58	1.92	1.98	0.07
		Malaysia	5.28	1.07	1.38	0.07	-	-	-	-	4.76	1.10	1.37	0.09
		Philippines	8.55	2.72	2.70	0.27	-	-	-	-	8.06	2.79	2.45	0.26
		Thailand	6.91	1.05	1.34	0.04	-	-	-	-	6.40	1.07	1.27	0.04
		Sub-group Avg.	*7.04*	*1.54*	*1.64*	*0.10*					*6.73*	*1.56*	*1.70*	*0.11*
	Europe	Czech Republic	5.37	1.71	1.56	0.14	-	-	-	-	5.59	1.80	1.25	0.09
		Hungary	5.36	1.58	1.42	0.11	-	-	-	-	5.46	1.69	1.64	0.15
		Poland	5.37	1.06	1.45	0.08	-	-	-	-	5.33	1.03	1.65	0.10
		Turkey	8.49	1.08	1.38	0.03	-	-	-	-	8.52	1.10	1.41	0.03
		Russia	13.81	2.47	2.81	0.10	-	-	-	-	13.04	2.56	2.70	0.11
		Sub-group Avg.	*7.68*	*1.58*	*1.72*	*0.09*					*7.59*	*1.64*	*1.73*	*0.10*
	Lat. America	Argentina	6.24	1.37	2.25	0.18	-	-	-	-	5.60	1.35	2.17	0.20
		Chile	3.87	1.28	1.73	0.26	-	-	-	-	3.86	1.26	1.64	0.23
		Colombia	5.01	1.18	1.60	0.12	-	-	-	-	5.07	1.19	1.59	0.12
		Peru	4.64	1.17	2.11	0.24	-	-	-	-	4.61	1.20	1.78	0.18
		Sub-group Avg.	*4.94*	*1.25*	*1.92*	*0.20*	-	-	-	-	*4.79*	*1.25*	*1.79*	*0.18*
	Group	***Mean***	***6.47***	***1.52***	***1.70***	***0.13***	-	-	-	-	***6.24***	***1.53***	***1.71***	***0.14***
		Median	***5.61***	***1.32***	***1.55***	***0.10***					***5.52***	***1.42***	***1.64***	***0.11***
Cross-Country		**Mean**	**5.50**	**1.61**	**1.48**	**0.15**	-	-	-	-	-	-	-	-
		Median	**5.20**	**1.35**	**1.49**	**0.11**	-	-	-	-	-	-	-	-

By contrast, the volatility (measured as standard deviations) of pure country factors in Panel B closely resembles the volatility calculated in Table 5.3. The average standard deviations across "all," "developed" and "emerging" sample are about 5.5, 3.17 and 6.24 percent per week, respectively. On average, the difference between the average country volatilities computed under two industry classification systems is only about 0.3 percent per week. Similar results are also obtained for the volatilities of cumulative industry factors but their magnitudes become slightly higher than the volatilities computed under the broad industry classification system, about 1.50 percent ("all" sample), 1.09 percent ("developed" sample) and 1.43 percent ("emerging" sample) per week, respectively. Variance ratio measures also exhibit the similar patterns as the volatilities: Pure country variance ratios decrease whereas (cumulative) industrial variance ratios increase in their magnitudes relative to their counterparts in Table 5.3.

In summary, both variance ratios and standard deviations in Tables 5.3 and 5.4 indicate that the country factor is still an important factor in determining market performance during the period of 1994-2003. This empirical evidence is quite robust to the different industry classification systems with different granularities. Weak evidence, however, is also provided in Tables 5.3 and 5.4 that the industry factor has become an important factor when a the finely-partitioned industry classification is used, although the proportion of the variation in the realized market returns explained by the industry factor is still small relative to the country factor in each market.

5.2.4 Regression-Based Analysis

As argued in Chapter 3, estimated factors from the dummy variable regression model of Heston and Rouwenhorst (1994) can be roughly interpreted as the return on factor mimicking portfolio with maximum exposure to either industry or country factors. Thereby, each factor will be augmented into several linear multifactor models to examine the contribution of each factor to average market returns and volatilities. Notably, in each model, the industry factor is formulated as a value-weighted sum of cross-sectional factor loadings for all industries available in each market. Thus, the resulting industry factor is reflective of the differences in industrial composition of each market.

In order to save space, regression results are presented and discussed for the industry and country factors estimated from industry returns on ten FTSE Economic Groups. As regards those factors estimated from industry returns on 39 finely-partitioned FTSE Industry Sectors, only major findings are discussed and regression results are presented in Appendix C.

A. Average Market Returns

In order to examine the unconditional relationship between average market returns and industry and country factors, for each market, following four models are specified:

Model I—Single factor model:

$$r_{k,t} = \alpha_k + \beta_k r_{FTSE,t} ;$$

Model II—Two-factor (country) model:

$$r_{k,t} = \alpha_k + \beta_k r_{FTSE,t} + [\text{Country Factor}]_{k,t} ;$$

Model III—Two-factor (industry) model:

$$r_{k,t} = \alpha_k + \beta_k r_{FTSE,t} + [\text{Industry Factor}]_{k,t} ; \qquad \text{and,}$$

Model IV—Three-factor model:

$$r_{k,t} = \alpha_k + \beta_k r_{FTSE,t} + [\text{Country Factor}]_{k,t} + [\text{Industry Factor}]_{k,t} .$$

Table 5.5 shows the OLS regression results of the above four model specifications. In order to save space, intercepts for each model are not reported, which are unanimously insignificant for almost all four models. The regression results for the finely-partitioned industry classification are reported in Appendix C.2. To make models comparable across different specifications, adjusted R^2s are also reported. Jarque-Bera statistics are reported in each regression as an indicator of the normality of residuals.

Table 5.5

Time Series Regression (OLS) of Excess Country Index Return (U.S. Dollar-Denominated) on Excess World Market Index Return, Value-Weighted [Cumulative] Industry and Country Factors, All Sample [Stock] Markets (January 1994 – June 2003)

This table reports the estimated coefficients for each factor, i.e., a world market factor (FTSE), a country factor (CNT) and a value-weighted [cumulative] industry factor (IND), from the OLS regression for each country. Newey and West (1987) heteroscedasticity and autocorrelation consistent (HAC) standard errors are reported for each coefficient (in square brackets), along with some residual diagnostics for four time series regression models specified for each country. Four time series regressions models are: Model I—ICAPM: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t}$; Model II—ICAPM + Country Factor: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t} + [\text{Country Factor}]_{k,t}$; Model III—ICAPM + Industry Factor: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t} + [\text{Industry Factor}]_{k,t}$; and, Model IV—ICAPM + Country Factor + Industry Factor: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t} + [\text{Country Factor}]_{k,t} + [\text{Industry Factor}]_{k,t}$. ICAPM model is used as the benchmark model. r_k (r_{FTSE}) is the weekly excess return of country k (a world market portfolio) above a one-week Eurodollar deposit rate; country and value-weighted cumulative industry factors are estimated from a dummy variable regression model of Heston and Rouwenhorst (1994) via industry returns on all available FTSE Economic Group indices in all sample markets (33). Capital-weights are computed by using market capitalization at the beginning of the synthetic week (Wednesday-to-Wednesday) for each available Economic Group index within each market. Adjusted (Adj.) R^2 is reported for each model specification in each country as an indicator of the explanatory power of that model. Residual diagnostics are also reported: Jarque-Bera statistic (JB-stat) is indicative of normality of the residuals; and, Ljung-Box statistic (LB-stat) tests for the serial correlation in the residuals. Significance at the 1% level is denoted by ***, at the 5% level by **, and at the 10% level by *.

Group	Sub-group	Country	Model I: ICAPM				Model II: ICAPM + Country Factor				
			FTSE	Adj. R-sq.	JB-stat	LB-stat	FTSE	CNT	Adj. R-sq.	JB-stat	LB-stat
DSM	G7	Canada	0.914***	0.583	56.506***	32.080	0.911***	0.238***	0.636	64.692***	25.398
			[0.042]				[0.039]	[0.036]			
		United States	1.062***	0.858	3.231	38.922**	1.027***	0.604***	0.921	0.676	35.646*
			[0.022]				[0.019]	[0.039]			
		France	1.092***	0.607	42.206***	51.446***	0.990***	0.587***	0.837	49.876***	53.945***
			[0.068]				[0.041]	[0.036]			
		Germany	1.214***	0.637	22.834***	39.065**	1.218***	0.182***	0.676	64.210***	28.712
			[0.066]				[0.059]	[0.070]			
		United Kingdom	0.858***	0.617	28.565***	50.988***	0.861***	0.087***	0.644	34.605***	45.765***
			[0.046]				[0.042]	[0.017]			
		Italy	1.006***	0.383	32.346***	28.421	1.016***	0.472***	0.606	396.557***	14.763
			[0.063]				[0.057]	[0.074]			
		Japan	0.732***	0.258	92.823***	34.872	0.896***	0.565***	0.656	33.422***	33.945
			[0.083]				[0.050]	[0.027]			
	Asia/ Australasia	Australia	0.633***	0.327	10.455***	28.449	0.787***	0.310***	0.487	6.443**	31.436
			[0.050]				[0.049]	[0.035]			
		New Zealand	0.535***	0.157	40.707***	53.254***	0.721***	0.553***	0.495	9.111**	35.380
			[0.078]				[0.055]	[0.041]			
		Hong Kong/China	0.924***	0.267	151.960***	30.486	0.923***	0.179***	0.371	66.449***	26.783
			[0.081]				[0.069]	[0.044]			
		Singapore	0.803***	0.177	168.568***	33.393	0.809***	0.324***	0.444	217.400***	22.104
			[0.098]				[0.065]	[0.054]			

Group	Sub-group	Country	Model III: ICAPM + Industry Factor					Model IV: ICAPM + Country Factor + Industry Factor					
			FTSE	IND	Adj. R-sq.	JB-stat	LB-stat	FTSE	CNT	IND	Adj. R-sq.	JB-stat	LB-stat
DSM	G7	Canada	0.914***	0.035	0.582	56.759***	31.658	0.907***	0.250***	-0.173	0.637	62.823***	28.023
			[0.042]	[0.123]				[0.039]	[0.037]	[0.117]			
		United States	1.060***	0.082	0.858	3.485	38.361*	1.031***	0.637***	-0.351***	0.923	3.178	40.510**
			[0.022]	[0.086]				[0.019]	[0.040]	[0.080]			
		France	1.093***	0.043	0.606	42.133***	51.148***	0.985***	0.589***	-0.182	0.837	49.980***	53.964***
			[0.068]	[0.167]				[0.041]	[0.036]	[0.123]			
		Germany	1.214***	-0.067	0.637	22.384***	40.144**	1.217***	0.185**	-0.127*	0.677	71.188***	31.242
			[0.066]	[0.071]				[0.059]	[0.072]	[0.073]			
		United Kingdom	0.861***	0.048	0.617	28.272***	51.862***	0.853***	0.093***	-0.117	0.645	36.079***	43.318**
			[0.046]	[0.080]				[0.043]	[0.018]	[0.076]			
		Italy	1.004***	-0.031	0.382	31.465***	28.526	1.006***	0.482***	-0.181**	0.611	407.350***	14.948
			[0.062]	[0.080]				[0.057]	[0.074]	[0.075]			
		Japan	0.733***	-0.192	0.258	97.099***	35.348	0.914***	0.608***	-1.121***	0.692	10.944***	33.115
			[0.083]	[0.213]				[0.045]	[0.029]	[0.202]			
	Asia/ Australasia	Australia	0.636***	0.032	0.325	10.390***	28.473	0.783***	0.311***	-0.045	0.486	6.470**	31.217
			[0.053]	[0.083]				[0.050]	[0.035]	[0.075]			
		New Zealand	0.540***	0.127**	0.163	41.603***	53.182***	0.723***	0.550***	0.081*	0.497	9.503***	34.655
			[0.078]	[0.054]				[0.055]	[0.040]	[0.045]			
		Hong Kong/China	0.924***	-0.013	0.265	150.990***	30.530	0.923***	0.179***	0.024	0.369	67.237***	26.827
			[0.081]	[0.107]				[0.069]	[0.044]	[0.104]			
		Singapore	0.808***	0.152	0.177	171.126***	32.737	0.811***	0.324***	0.071	0.443	211.648***	22.171
			[0.099]	[0.136]				[0.065]	[0.054]	[0.131]			

(Table 5.5 - *Continued*)

Group	Sub-group	Country	Model I: ICAPM				Model II: ICAPM + Country Factor					Model III: ICAPM + Industry Factor					Model IV: ICAPM + Country Factor + Industry Factor					
			FTSE	Adj. R-sq.	JB-stat	LB-stat	FTSE	CNT	Adj. R-sq.	JB-stat	LB-stat	FTSE	IND	Adj. R-sq.	JB-stat	LB-stat	FTSE	CNT	IND	Adj. R-sq.	JB-stat	LB-stat
ESM	Advanced	Brazil	1.242***	0.193	877.580***	43.007**	1.237***	0.364***	0.439	553.969***	47.113***	1.248***	0.071	0.192	872.995***	42.978**	1.245***	0.365***	0.116	0.439	554.479***	46.627***
			[0.222]				[0.173]	[0.050]				[0.227]	[0.212]				[0.177]	[0.050]	[0.198]			
		Mexico	1.195***	0.245	333.586***	40.091**	0.982***	0.620***	0.758	15.549***	36.396*	1.199***	0.074	0.245	335.273***	40.327**	0.982***	0.620***	0.013	0.758	15.660***	36.385*
			[0.107]				[0.060]	[0.027]				[0.108]	[0.055]				[0.060]	[0.027]	[0.048]			
		Israel	0.651***	0.150	26.419***	21.653	0.751***	0.547***	0.534	27.778***	31.893	0.638***	-0.250	0.152	28.693***	23.428	0.728***	0.555***	-0.474***	0.546	20.300***	33.869
			[0.068]				[0.055]	[0.040]				[0.068]	[0.196]				[0.055]	[0.038]	[0.169]			
		Korea	1.222***	0.179	397.509***	67.556***	1.167***	0.256*	0.384	5032.801***	46.968***	1.233***	-0.288	0.183	389.983***	60.797***	1.179***	0.257*	-0.329**	0.390	5408.430***	39.744**
			[0.136]				[0.102]	[0.141]				[0.136]	[0.195]				[0.102]	[0.142]	[0.155]			
		Taiwan/China	0.737***	0.126	36.257***	15.459	0.923***	0.558***	0.483	111.282***	26.745	0.723***	0.105	0.126	32.762***	15.362	0.941***	0.565***	-0.121	0.484	109.896***	26.646
			[0.083]				[0.081]	[0.049]				[0.086]	[0.109]				[0.082]	[0.047]	[0.126]			
		South Africa	0.711***	0.178	160.616***	39.007**	0.758***	0.505***	0.554	219.229***	27.012	0.718***	0.067	0.177	153.552***	38.405*	0.743***	0.512***	-0.163*	0.556	217.149***	25.179
			[0.082]				[0.061]	[0.051]				[0.083]	[0.122]				[0.062]	[0.050]	[0.086]			
	Asia	India	0.275***	0.021	21.893***	32.778	0.459***	0.238*	0.191	2525.865***	39.805**	0.276***	-0.109	0.020	21.442***	33.189	0.460***	0.238*	-0.092	0.190	2622.486***	39.741**
			[0.088]				[0.097]	[0.124]				[0.088]	[0.169]				[0.098]	[0.124]	[0.211]			
		Pakistan	0.112	0.000	105.850***	28.607	0.591***	0.788***	0.744	79.534***	33.238	0.110	-0.058	-0.002	108.693***	28.823	0.616***	0.810***	0.445***	0.761	75.128***	27.748
			[0.112]				[0.057]	[0.038]				[0.112]	[0.177]				[0.057]	[0.037]	[0.135]			
		China	0.253***	0.009	211.808***	33.822	0.831***	0.846***	0.792	875.882***	24.233	0.256***	0.072	0.008	212.418***	33.733	0.851***	0.851***	0.394	0.797	265.976***	21.908
			[0.098]				[0.048]	[0.042]				[0.098]	[0.183]				[0.047]	[0.038]	[0.271]			
		Indonesia	0.521***	0.021	194.825***	29.811	0.563***	0.420***	0.534	611.363***	52.185***	0.518***	-0.041	0.018	191.946***	29.615	0.568***	0.420***	0.083	0.533	606.128***	52.425***
			[0.176]				[0.113]	[0.062]				[0.176]	[0.174]				[0.114]	[0.061]	[0.113]			
		Malaysia	0.498***	0.043	1199.693***	40.572**	0.691***	0.716***	0.742	146.070***	38.894**	0.475***	-0.450	0.047	1187.975***	37.522*	0.673***	0.715***	-0.351	0.745	107.428***	40.785**
			[0.104]				[0.056]	[0.048]				[0.099]	[0.332]				[0.053]	[0.047]	[0.280]			
		Philippines	0.515***	0.054	258.800***	32.178	0.642***	0.349***	0.449	115.697***	40.688**	0.521***	0.116	0.052	255.403***	31.752	0.654***	0.350***	0.239	0.450	115.450***	39.083**
			[0.126]				[0.072]	[0.046]				[0.127]	[0.218]				[0.073]	[0.047]	[0.169]			
		Thailand	1.003***	0.094	75.815***	60.122***	1.209***	0.699***	0.525	207.322***	54.568***	1.001***	-0.076	0.092	73.464***	59.674***	1.219***	0.703***	0.262	0.526	200.469***	55.234***
			[0.191]				[0.130]	[0.041]				[0.189]	[0.350]				[0.130]	[0.041]	[0.274]			
	Europe	Czech Republic	0.571***	0.106	0.642	34.057	0.802***	0.593***	0.473	2.648	27.046	0.571***	-0.007	0.104	0.603	33.960	0.806***	0.595***	0.057	0.472	2.782	26.368
			[0.099]				[0.063]	[0.042]				[0.100]	[0.073]				[0.063]	[0.042]	[0.110]			
		Hungary	0.860***	0.229	10.478***	32.275	1.022***	0.474***	0.525	4.909*	37.959**	0.871***	0.133	0.228	9.856***	32.980	1.024***	0.474***	0.024	0.523	5.027*	38.172**
			[0.120]				[0.085]	[0.034]				[0.119]	[0.115]				[0.084]	[0.034]	[0.133]			
		Poland	0.840***	0.109	592.333***	56.623***	0.902***	0.713***	0.734	3.712	22.650	0.849***	0.282	0.112	582.950***	55.326***	0.910***	0.713***	0.275***	0.738	2.943	20.079
			[0.114]				[0.065]	[0.032]				[0.114]	[0.183]				[0.065]	[0.032]	[0.102]			
		Turkey	1.004***	0.063	50.190***	30.336	1.041***	0.729***	0.690	7271.314***	30.953	0.951***	-0.915**	0.074	45.928***	33.251	1.022***	0.726***	-0.324	0.691	7919.521***	29.839
			[0.228]				[0.128]	[0.069]				[0.230]	[0.377]				[0.131]	[0.069]	[0.251]			
		Russia	1.203***	0.103	100.776***	39.387**	0.927***	0.463***	0.533	334.389***	36.178*	1.171***	-0.348	0.107	103.450***	41.363**	0.939***	0.470***	0.184	0.534	312.646***	34.893*
			[0.242]				[0.129]	[0.073]				[0.235]	[0.246]				[0.131]	[0.073]	[0.159]			
	Lat. America	Argentina	0.875***	0.111	314.498***	32.037	0.721***	0.639***	0.671	619.856***	43.706**	0.872***	-0.029	0.109	313.135***	31.879	0.718***	0.639***	-0.028	0.670	657.928***	43.312**
			[0.123]				[0.095]	[0.045]				[0.127]	[0.116]				[0.095]	[0.046]	[0.136]			
		Chile	0.582***	0.133	93.339***	47.624***	0.704***	0.328***	0.299	545.213***	57.353***	0.578***	-0.068	0.132	93.689***	47.704***	0.699***	0.329***	-0.104	0.300	543.690***	56.459***
			[0.065]				[0.068]	[0.090]				[0.065]	[0.075]				[0.068]	[0.090]	[0.075]			
		Colombia	0.218**	0.011	253.088***	48.312***	0.565***	0.545***	0.579	11954.082***	56.897***	0.211**	-0.098	0.010	252.141***	49.260***	0.602***	0.561***	0.382***	0.592	9450.515***	53.472***
			[0.091]				[0.086]	[0.058]				[0.089]	[0.134]				[0.076]	[0.053]	[0.144]			
		Peru	0.338***	0.029	154.822***	36.678*	0.687***	0.715***	0.491	166.999***	33.984	0.349***	0.171**	0.032	161.604***	35.708*	0.697***	0.714***	0.163	0.495	168.412***	32.589
			[0.090]				[0.077]	[0.062]				[0.090]	[0.084]				[0.078]	[0.062]	[0.117]			

Ljung-Box statistics, on the other hand, are reported as test results for the possible existence of autocorrelation in the residuals. With the fear that the estimated factors from the dummy variable regression model of Heston and Rouwenhorst (1994), though cross-sectionally orthogonal, may be serially correlated, Newey and West (1987) heteroscedasticity and autocorrelation consistent (HAC) standard errors are also reported for each coefficient (in square brackets) in Table 5.5 and HAC *t*-statistics are thereby computed.

When specified as the single-factor ICAPM model, Table 5.5 shows that almost all markets have significant exposures to the world market portfolio (significant at 1 percent level)—a proxy for the world market risk premium or the world factor, with the only exception of Pakistan. Most developed markets have their world market betas almost equal to one. The explanatory powers, measured as adjusted R^2s, across markets do not appear to be uniform. Developed markets, especially G7 markets, usually have higher adjusted R^2s than emerging markets. Among them, the U.S. has the highest. About 86 percent of the variation in the U.S. market returns is explained by world factor. This evidence is indicative of the fact that developed markets are more integrated with the world capital market than emerging markets (Bekaert (1995)).

When the country factor is augmented in the ICAPM, the coefficients for both world market and country factors are quite significant at 1 percent level for almost all countries, except India, for which the country factor is marginally significant at 10 percent level. The coefficients for world market portfolio almost fluctuate around one for all countries. As of coefficients for country factor, it is not surprising to see that most of emerging markets have relatively larger exposures to this factor due to the market segmentation. In most emerging markets, the world market betas are larger than country betas, and some of them are almost identical to their exposures to world factor, for example, China, 0.831 (world) versus 0.846 (country). All 22 emerging markets have witnessed significant increase in adjusted R^2s. For instance, the adjusted R^2 for Pakistan has increased from almost zero percent for the single-factor ICAPM model to 74.4 percent for this two-factor (country) model. On the other hand, some developed markets also have higher and significant exposures to country factor, such as the U.S. (0.604), France (0.587), Japan (0.565) and New Zealand (0.553). For example, the U.S. has experienced several unique events, such as ten-year economic booming during the administration of former U.S. President Bill Clinton and the negative impact from 9/11

Terrorists Attack that has deterred its economic recovery. For New Zealand, it has quite fewer representative stocks compared to other developed markets. Thereby, a strong country factor is expected to dominate its market performance due to its under-representation problem. Overall, the adjusted R^2s for the two-factor (country) model have increased moderately for eleven developed markets. The empirical results are also robust to the finely-partitioned version of industry classification as presented in Appendix C.2.

What about the industry factor? In the third model, the industry factor has been augmented within the ICAPM model, or a two-factor (industry) model. The regression results show less successful story than the previous model. Coefficients for the world market portfolio are still significant for almost all countries but their magnitudes are almost identical to those estimated from the ICAPM model. For 11 developed markets, only one country has significant exposure to the industry factor, i.e., New Zealand, about 0.127. As of emerging markets, only two countries have the significant exposure to industry factor, i.e., Turkey (-0.915) and Peru (0.171). When examining Appendix C.2, which is supposed to exhibit strong impact from industry factor due to the refined version of industry classification, the estimation results show that more emerging markets have significant exposures to industry factor than the number in Table 5.5, for example, Taiwan/China, Indonesia, Malaysia, Poland, Russia have joined in. Interestingly, Turkey and New Zealand, on the other hand, have insignificant exposures to industry factor aggregated from 39 FTSE Industry Sectors while the U.K. exhibits marginal significant exposure, about 0.186. Analogously, adjusted R^2s for both tables (Table 5.5 and Appendix C.2) do not increase significantly as they did in the second model specification, almost identical to those of single-factor ICAPM model.

When three factors are considered together, as specified in Model 4, the regression results in Table 5.5 suggest that world and country factors are the most important forces driving the average country returns. After controlling for those two factors, several countries also have significant exposures to the industry factor, measured in its aggregate form. Those countries include the U.S. (-0.351), Japan (-1.121), Israel (-0.474), Pakistan (0.455), Poland (0.275) and Columbia (0.382), all significant at 1 percent level. The negative exposures for the first three countries may be attributed to the volatile performance of IT industries, in which all three markets have a significant proportion of market capitalization. The adjusted R^2s are almost identical to those of Model 2. In Appendix C.2, several countries have dropped their significance level, such as Israel, while some others have improved, such as Italy and China. The U.S. still has the significant negative exposure to industry factor with the coefficient identical to that in Table 5.5. However, the explanatory powers of this model specification have improved for most of countries relative to the two-factor (country) model.

Table 5.6 and Appendix C.3 provide the regression results for two sub-samples in which either developed or emerging markets are considered. The estimation results closely resemble to those reported in Table 5.5 and Appendix C.2. Interestingly, Panel A of Table 5.6 shows that when developed markets are considered alone, industry factor becomes more pronounced for the three-factor model (Model 4). The U.S., France, Italy, and Japan all have significant (significant at 1 percent level) and negative exposures to industry factor, with Japan has the highest absolute beta. In Panel A of Appendix C.3, however, most of industry betas have positive signs, with New Zealand has the highest industry beta, in absolute value.

The above analysis shows that during 1994-2004, measured as adjusted R^2s, the country factor is important in determining the average country returns relative to the industry factor and the explanatory power of a two-factor (country) model has also improved with respect to a model with single world market factor. However, when all three factors considered together, industry factor, in its value-weighted aggregate form, may also be an important factor, after the country returns adjusted for world and country factors. Puzzles still exist that why some countries have negative exposures to industry factor. One possible explanation relates this puzzle to the abnormal performance of IT industry during the sample period; but it is not adequate enough to explain such a puzzle across all countries. Further, the conclusion drawn from Table 5.5 (Appendix C.2) and Table 5.6 (Appendix C.3) is still premature. As indicated by Jarque-Bera and Ljung-Box statistics in both tables (appendices), the residuals from four models are not normally distributed and some of them are serially correlated. Hence the OLS technique used to minimize the sum of residuals may be misspecified, if normal distributions are assumed for the maximum likelihood functions. The adjusted R^2s may also produce spurious indicators to compare goodness of the model specifications.

Table 5.6

Time Series Regression (OLS) of Excess Country Index Return (U.S. Dollar-Denominated) on Excess World Market Index Return, Value-Weighted [Cumulative] Industry and Country Factors, Sub-samples of Developed and Emerging [Stock] Markets (January 1994 – June 2003)

This table reports the estimated coefficients for each factor, i.e., a world market factor (FTSE), a country factor (CNT) and a value-weighted [cumulative] industry factor (IND), from the OLS regression for each country. Newey and West (1987) heteroscedasticity and autocorrelation consistent (HAC) standard errors are reported for each coefficient (in square brackets), along with some residual diagnostics for four time series regression models specified for each country. Four time series regressions models are: Model I—ICAPM: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t}$; Model II—ICAPM + Country Factor: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t} + [\text{Country Factor}]_{k,t}$; Model III—ICAPM + Industry Factor: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t} + [\text{Industry Factor}]_{k,t}$; and, Model IV—ICAPM + Country Factor + Industry Factor: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t} + [\text{Country Factor}]_{k,t} + [\text{Industry Factor}]_{k,t}$. ICAPM model is used as the benchmark model. r_k (r_{FTSE}) is the weekly excess return of country k (a world market portfolio) above a one-week Eurodollar deposit rate; country and value-weighted cumulative industry factors are estimated from a dummy variable regression model of Heston and Rouwenhorst (1994) via industry returns on all available FTSE Economic Group indices in two sub-samples of markets. Panel A reports the regression results for a sub-sample of developed markets (11); and, Panel B for a sub-sample of emerging markets (22). Capital-weights are computed by using market capitalization at the beginning of each synthetic week (Wednesday-to-Wednesday) for each available Economic Group index within each market. Adjusted (Adj.) R^2 is reported for each model specification in each country as an indicator of the explanatory power of that model. Residual diagnostics are also reported: Jarque-Bera statistic (JB-stat) is indicative of normality of the residuals; and Ljung-Box statistic (LB-stat) tests for the serial correlation in the residuals. Significance at the 1% level is denoted by ***, at the 5% level by **, and at the 10% level by *.

Panel A: Developed Markets Only

Group	Sub-group	Country	Model I: ICAPM FTSE	Adj. R-sq.	JB-stat	LB-stat
DSM	G7	Canada	0.914***	0.583	56.506***	32.080
			[0.042]			
		United States	1.062***	0.858	3.231	38.922**
			[0.022]			
		France	1.092***	0.607	42.206***	51.446***
			[0.068]			
		Germany	1.214***	0.637	22.834***	39.065**
			[0.066]			
		United Kingdom	0.858***	0.617	28.565***	50.988***
			[0.046]			
		Italy	1.006***	0.383	32.346***	28.421
			[0.063]			
		Japan	0.732***	0.258	92.823***	34.872
			[0.083]			
	Asia/ Australasia	Australia	0.633***	0.327	10.455***	28.449
			[0.050]			
		New Zealand	0.535***	0.157	40.707***	53.254***
			[0.078]			
		Hong Kong/China	0.924***	0.267	151.960***	30.486
			[0.081]			
		Singapore	0.803***	0.177	168.568***	33.393
			[0.098]			

Country	Model II: ICAPM + Country Factor FTSE	CNT	Adj. R-sq.	JB-stat	LB-stat
Canada	0.911***	0.315***	0.662	95.185***	33.903
	[0.036]	[0.038]			
United States	1.029***	0.598***	0.919	6.426**	33.954
	[0.018]	[0.042]			
France	0.965***	0.607***	0.845	116.840***	36.086*
	[0.035]	[0.033]			
Germany	1.208***	0.216***	0.686	88.031***	33.877
	[0.061]	[0.078]			
United Kingdom	0.863***	0.092***	0.649	29.531***	46.222***
	[0.042]	[0.016]			
Italy	1.023***	0.557***	0.661	245.334***	29.973
	[0.054]	[0.069]			
Japan	0.921***	0.598***	0.662	534.145***	39.884**
	[0.045]	[0.060]			
Australia	0.776***	0.369***	0.542	11.189***	46.032***
	[0.047]	[0.035]			
New Zealand	0.748***	0.607***	0.529	7.623**	46.257***
	[0.051]	[0.035]			
Hong Kong/China	0.936***	0.210***	0.394	79.792***	26.956
	[0.068]	[0.050]			
Singapore	0.862***	0.551***	0.625	42.928***	24.057
	[0.058]	[0.044]			

Country	Model III: ICAPM + Industry Factor FTSE	IND	Adj. R-sq.	JB-stat	LB-stat
Canada	0.914***	0.013	0.582	56.881***	32.090
	[0.042]	[0.101]			
United States	1.063***	-0.075	0.858	2.847	38.117*
	[0.023]	[0.107]			
France	1.089***	-0.124	0.607	43.139***	51.471***
	[0.068]	[0.199]			
Germany	1.199***	0.224*	0.640	20.636***	41.217**
	[0.066]	[0.115]			
United Kingdom	0.866***	0.095	0.618	26.000***	52.832***
	[0.047]	[0.080]			
Italy	1.011***	0.063	0.382	33.818***	29.199
	[0.063]	[0.083]			
Japan	0.751***	-0.762**	0.271	68.756***	30.526
	[0.083]	[0.357]			
Australia	0.633***	0.003	0.325	10.373***	28.565
	[0.051]	[0.059]			
New Zealand	0.535***	0.005	0.155	40.864***	53.291***
	[0.079]	[0.104]			
Hong Kong/China	0.925***	-0.263	0.271	153.984***	29.023
	[0.081]	[0.190]			
Singapore	0.797***	0.285*	0.184	161.671***	36.623*
	[0.096]	[0.148]			

Country	Model IV: ICAPM + Country Factor + Industry Factor FTSE	CNT	IND	Adj. R-sq.	JB-stat	LB-stat
Canada	0.909***	0.326***	-0.155*	0.664	88.489***	33.156
	[0.036]	[0.039]	[0.090]			
United States	1.032***	0.631***	-0.450***	0.923	1.922	31.159
	[0.018]	[0.039]	[0.101]			
France	0.956***	0.612***	-0.352***	0.848	119.707***	35.052
	[0.034]	[0.034]	[0.118]			
Germany	1.196***	0.214***	0.172	0.688	80.451***	34.772
	[0.061]	[0.078]	[0.108]			
United Kingdom	0.857***	0.097***	-0.079	0.649	33.423***	44.524**
	[0.044]	[0.017]	[0.082]			
Italy	0.995***	0.606***	-0.407***	0.682	96.641***	22.602
	[0.054]	[0.055]	[0.122]			
Japan	0.963***	0.626***	-1.360***	0.706	80.580***	28.853
	[0.040]	[0.043]	[0.302]			
Australia	0.776***	0.373***	-0.073	0.543	12.438***	44.248**
	[0.047]	[0.035]	[0.053]			
New Zealand	0.770***	0.618***	0.177**	0.534	9.050**	47.886***
	[0.049]	[0.033]	[0.087]			
Hong Kong/China	0.936***	0.209***	-0.040	0.393	80.648***	26.757
	[0.069]	[0.050]	[0.154]			
Singapore	0.860***	0.548***	0.106	0.625	38.569***	25.611
	[0.058]	[0.044]	[0.159]			

Panel B: Emerging Markets Only

Group	Sub-group	Country	Model I: ICAPM				Model II: ICAPM + Country Factor					Model III: ICAPM + Industry Factor					Model IV: ICAPM + Country Factor + Industry Factor					
			FTSE	Adj. R-sq.	JB-stat	LB-stat	FTSE	CNT	Adj. R-sq.	JB-stat	LB-stat	FTSE	IND	Adj. R-sq.	JB-stat	LB-stat	FTSE	CNT	IND	Adj. R-sq.	JB-stat	LB-stat
ESM	*Advanced*	Brazil	1.242***	0.193	877.580***	43.007**	1.221***	0.350***	0.364	558.831***	46.181***	1.255***	0.237	0.194	870.584***	42.553**	1.234***	0.351***	0.271	0.366	562.749***	45.499**
			[0.222]				[0.192]	[0.053]				[0.226]	[0.277]				[0.196]	[0.053]	[0.289]			
		Mexico	1.195***	0.245	333.586***	40.091**	0.970***	0.566***	0.600	59.139***	51.434***	1.198***	0.084	0.245	336.555***	40.187**	0.969***	0.566***	-0.004	0.599	59.001***	51.441***
			[0.107]				[0.096]	[0.056]				[0.107]	[0.057]				[0.096]	[0.056]	[0.155]			
		Israel	0.651***	0.150	26.419***	21.653	0.695***	0.336***	0.341	153.046***	19.433	0.642***	-0.235	0.153	27.254***	23.385	0.678***	0.357***	-0.503***	0.363	81.722***	21.263
			[0.068]				[0.064]	[0.068]				[0.068]	[0.163]				[0.067]	[0.061]	[0.154]			
		Korea	1.222***	0.179	397.509***	67.556***	1.146***	0.287**	0.373	2522.312***	42.948**	1.236***	-0.287	0.183	407.101***	60.369***	1.159***	0.286**	-0.240	0.375	2585.679***	39.636**
			[0.136]				[0.111]	[0.145]				[0.136]	[0.205]				[0.111]	[0.145]	[0.171]			
		Taiwan/China	0.737***	0.126	36.257***	15.459	0.844***	0.379***	0.289	45.274***	20.868	0.728***	0.062	0.125	34.287***	15.446	0.842***	0.378***	0.012	0.287	45.495***	20.808
			[0.083]				[0.080]	[0.067]				[0.086]	[0.097]				[0.082]	[0.066]	[0.144]			
		South Africa	0.711***	0.178	160.616***	39.007**	0.724***	0.362***	0.348	201.843***	33.168	0.713***	0.025	0.176	159.195***	38.668*	0.713***	0.366***	-0.135	0.348	209.052***	34.962
			[0.082]				[0.079]	[0.072]				[0.082]	[0.130]				[0.080]	[0.070]	[0.131]			
	Asia	India	0.275***	0.021	21.893***	32.778	0.419***	0.199**	0.141	547.081***	36.669*	0.277***	-0.071	0.019	22.410***	32.903	0.420***	0.199**	-0.025	0.139	556.500***	36.667*
			[0.088]				[0.091]	[0.097]				[0.088]	[0.166]				[0.092]	[0.096]	[0.244]			
		Pakistan	0.112	0.000	105.850***	28.607	0.493***	0.688***	0.562	255.067***	30.340	0.111	-0.148	-0.001	111.894***	28.957	0.500***	0.696***	0.266	0.566	284.914***	32.481
			[0.112]				[0.075]	[0.046]				[0.113]	[0.180]				[0.077]	[0.049]	[0.194]			
		China	0.253***	0.009	211.808***	33.822	0.673***	0.667***	0.569	549.008***	41.679**	0.258***	0.162	0.009	216.181***	34.039	0.680***	0.667***	0.203	0.570	618.283***	39.269**
			[0.098]				[0.085]	[0.069]				[0.098]	[0.184]				[0.089]	[0.069]	[0.220]			
		Indonesia	0.521***	0.021	194.825***	29.811	0.538***	0.428***	0.490	285.933***	48.379***	0.525***	0.079	0.019	191.116***	29.997	0.542***	0.428***	0.076	0.489	285.861***	48.422***
			[0.176]				[0.122]	[0.059]				[0.177]	[0.183]				[0.122]	[0.059]	[0.146]			
		Malaysia	0.498***	0.043	1199.693***	40.572**	0.637***	0.626***	0.501	630.751***	47.506***	0.484***	-0.371	0.046	1169.157***	38.720*	0.617***	0.630***	-0.547**	0.510	444.028***	44.066**
			[0.104]				[0.095]	[0.091]				[0.101]	[0.249]				[0.094]	[0.088]	[0.232]			
		Philippines	0.515***	0.054	258.800***	32.178	0.614***	0.325***	0.348	80.883***	41.524**	0.527***	0.331	0.056	246.662***	31.808	0.624***	0.324***	0.290	0.350	78.468***	40.595**
			[0.126]				[0.093]	[0.052]				[0.128]	[0.278]				[0.094]	[0.052]	[0.223]			
		Thailand	1.003***	0.094	75.815***	60.122***	1.157***	0.614***	0.382	84.513***	62.789***	0.996***	-0.302	0.094	71.190***	59.312***	1.153***	0.613***	-0.116	0.381	83.361***	62.746***
			[0.191]				[0.161]	[0.058]				[0.190]	[0.371]				[0.160]	[0.058]	[0.357]			
	Europe	Czech Republic	0.571***	0.106	0.642	34.057	0.695***	0.377***	0.282	2.162	30.962	0.571***	-0.007	0.104	0.596	33.952	0.696***	0.378***	0.039	0.280	2.253	31.324
			[0.099]				[0.089]	[0.060]				[0.100]	[0.077]				[0.090]	[0.061]	[0.076]			
		Hungary	0.860***	0.229	10.478***	32.275	0.956***	0.313***	0.376	4.276	30.062	0.873***	0.170	0.228	10.109***	33.482*	0.959***	0.312***	0.049	0.374	4.287	30.423
			[0.120]				[0.110]	[0.051]				[0.119]	[0.137]				[0.109]	[0.050]	[0.249]			
		Poland	0.840***	0.109	592.333***	56.623***	0.861***	0.571***	0.552	109.717***	26.139	0.845***	0.268	0.112	569.678***	54.995***	0.867***	0.573***	0.329***	0.559	126.874***	24.413
			[0.114]				[0.097]	[0.058]				[0.113]	[0.207]				[0.096]	[0.058]	[0.125]			
		Turkey	1.004***	0.063	50.190***	30.336	1.002***	0.677***	0.617	819.818***	44.335**	0.961***	-0.918***	0.078	47.387***	31.820	0.996***	0.675***	-0.121	0.617	865.519***	43.929**
			[0.228]				[0.163]	[0.057]				[0.227]	[0.280]				[0.167]	[0.055]	[0.278]			
		Russia	1.203***	0.103	100.776***	39.387**	0.926***	0.433***	0.451	175.353***	30.084	1.170***	-0.380	0.107	97.187***	41.369**	0.934***	0.437***	0.126	0.450	165.272***	29.067
			[0.242]				[0.159]	[0.073]				[0.236]	[0.243]				[0.161]	[0.073]	[0.206]			
	Lat. America	Argentina	0.875***	0.111	314.498***	32.037	0.716***	0.560***	0.503	435.788***	25.823	0.869***	-0.063	0.109	313.469***	31.774	0.722***	0.561***	0.069	0.502	407.671***	26.058
			[0.123]				[0.121]	[0.067]				[0.128]	[0.138]				[0.123]	[0.066]	[0.186]			
		Chile	0.582***	0.133	93.339***	47.624***	0.631***	0.155***	0.173	114.397***	46.988***	0.578***	-0.076	0.132	94.391***	47.532***	0.628***	0.158***	-0.114	0.174	114.815***	46.615***
			[0.065]				[0.067]	[0.047]				[0.065]	[0.084]				[0.067]	[0.047]	[0.087]			
		Colombia	0.218**	0.011	253.088***	48.312***	0.481***	0.451***	0.429	1911.610***	71.898***	0.213**	-0.078	0.009	255.177***	48.832***	0.495***	0.457***	0.173	0.432	1536.998***	69.262***
			[0.091]				[0.092]	[0.056]				[0.091]	[0.130]				[0.086]	[0.054]	[0.169]			
		Peru	0.338***	0.029	154.822***	36.678*	0.538***	0.463***	0.246	77.552***	30.902	0.347***	0.208**	0.033	158.038***	35.359	0.539***	0.461***	0.038	0.244	78.826***	30.790
			[0.090]				[0.099]	[0.078]				[0.089]	[0.098]				[0.099]	[0.078]	[0.097]			

Further, most of the countries surveyed in this thesis have experienced relatively volatile period during 1994-2003.The finding of the insignificance of the industry factor in the sample, especially in developed markets which are assumed to be more economically and financially integrated with each other as well as with the world capital market, may be attributed to the unusual events that usually influence the individual market as a whole rather that on an industry basis.

As a summary, when all 33 stock markets are considered together, the estimation results presented in this section illustrate that the world market factor is still an important factor to explain the average country returns, especially for developed markets, consistent with previous studies. An ICAPM model augmented by the country factor can be used to explain most of the variation in market returns. This phenomenon is more pronounced in emerging markets, which have witnessed a significant increase in the explanatory power of the model, either indicated by adjusted R^2s . Analogous results are also obtained for sub-sample of 22 emerging markets. In contrast, a two-factor model, in which world market and industry factors are incorporated, does not perform very well as expected. Compared with the ICAPM benchmark model, there is only marginal increase in model's explanatory power; in some countries, the explanatory power has even decreased.

Within a sub-sample consisting of eleven developed markets only, the regression results show that the industry factor has played marginally significant role in explaining the average county returns when a two-factor model including the industry factor is used. Nonetheless, when the industry factor is considered together with world market and country factors, regression results show that the industry factor plays significant role. This phenomenon is more pronounced in a sub-sample of eleven developed markets than it does in a full sample of 33 markets or a sub-sample of emerging markets. Notice that the industry factor in this thesis is translated as a composite of value-weighted cumulative industry factors of ten FTSE Economic Groups under a broad industry classification system or 39 FTSE Industry Sectors under a finely-partitioned classification. The empirical evidence may indicate that during the sample period of 1994-2003, the industry factor becomes an increasingly important factor for pricing security returns in developed markets, so do in a couple emerging markets.

B. Market Volatilities

Regression results in the previous section have shed some light on the explanatory power of the industry factor in explaining realized market returns. Given the importance of volatility as an important input for portfolio management, the relationship between market volatilities and industry and country factors will be examined within the framework of EGARCH family model, which allows incorporating exogenous variables directly into its conditional variance equation, such as industry and country factors estimated from the dummy variable regression model of Heston and Rouwenhorst (1994). Second, this model specification does not require the transformation of each factor into their positive values as usually required in a GARCH model. Therefore, with EGARCH model, it saves the possible misspecification of the model by arbitrarily constructing positive risk premia for each factor. Further, this model also allows examining the well-documented leverage effect, which says negative news has persistent impact on the volatility of security returns (Black (1976)).

The mean equation of EGARCH (1, 1) model is specified as the ICAPM. For the conditional variance equation, with the assumption that the residuals from the mean equation follow a normal distribution, four models are specified as follows:

Benchmark Model: An EGARCH(1,1) without the augmentation of exogenous factors;

Model I: EGARCH(1,1) + $[\text{Country Factor}]_{k,t}$;

Model II: EGARCH(1,1) + $[\text{Industry Factor}]_{k,t}$; and,

Model III: EGARCH(1,1) + $[\text{Country Factor}]_{k,t}$ + $[\text{Industry Factor}]_{k,t}$

Two versions of the above model specifications are run for each model specification, i.e., a version without the leverage effect and a version with the leverage effect. For each model per country, the coefficients for each factor are reported along with their standard deviations (in brackets). Both adjusted R^2s and BICs are used as indicators of the effectiveness of each model specification fitting in the data.

Table 5.7

Impact of Value-Weighted [Cumulative] Industry (Ten FTSE Economic Groups) and Country Factors in Variance of Residuals from ICAPM Model, An EGARCH (1, 1) Model without Leverage Effect, All Sample [Stock] Markets (January 1994 – June 2003)

This table reports the estimated coefficients for each factor, i.e., a world market factor (FTSE), a country factor (CNT) and a value-weighted [cumulative] industry factor (IND), from the EGARCH regression model for each country. Standard errors are reported for each coefficient in square brackets, along with some model specification diagnostics. The mean equation is specified as an ICAPM model: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t}$; and, the conditional variance equations are specified as three augmented EGARCH(1,1) processes without leverage effect. They are: Model I: $\text{EGARCH}(1,1) + [\text{Country Factor}]_{k,t}$; Model II: $\text{EGARCH}(1,1) + [\text{Industry Factor}]_{k,t}$; and, Model III: $\text{EGARCH}(1,1) + [\text{Country Factor}]_{k,t} + [\text{Industry Factor}]_{k,t}$, with the assumption that the residuals from the mean equation follow a normal distribution. An EGARCH(1,1) without the leverage effect is used as the reference model and is reported under column "Benchmark: ICAPM + EGARCH." r_k (r_{FTSE}) is the weekly excess return of country k (a world market portfolio) above a one-week Eurodollar deposit rate; country and value-weighted industry factors are estimated from a dummy variable regression model of Heston and Rouwenhorst (1994) via industry returns on all available FTSE Economic Group indices in all sample markets (33). Capital-weights are computed by using market capitalization at the beginning of the synthetic week (Wednesday-to-Wednesday) for each available Economic Group index within each market. Both adjusted R^2s and Schwartz Bayesian Information Criterion (BIC) is also provided along with each model to compare the effectiveness of four model specifications. Significance at the 1% level is denoted by ***, at the 5% level by **, and at the 10% level by *.

Group	Sub-group	Country	Benchmark: ICAPM + EGARCH			Model I: Country Factor				Model II: Industry Factor				Model III: Country Factor + Industry Factor				
			FTSE	Adj. R-sq	BIC	FTSE	CNT	Adj. R-sq	BIC	FTSE	IND	Adj. R-sq	BIC	FTSE	CNT	IND	Adj. R-sq	BIC
DSM	G7	Canada	0.883***	0.579	-2666.5	0.881***	<0.000	0.578	-2660.8	0.885***	-3.000	0.579	-2661.5	0.886***	>0.000	-3.000	0.578	-2655.1
			[0.031]			[0.033]	[0.989]			[0.031]	[3.445]			[0.032]	[0.983]	[3.594]		
		United States	1.059***	0.857	-3208.5	1.059***	-2.000	0.857	-3202.5	1.064***	24.670**	0.857	-3205.2	1.064***	-4.000	27.020**	0.856	-3199.4
			[0.018]			[0.018]	[4.651]			[0.017]	[14.466]			[0.018]	[4.707]	[15.004]		
		France	1.036***	0.603	-2520.6	1.030***	-4.340***	0.601	-2521.5	1.028***	8.000	0.602	-2515.2	1.026***	-4.271***	7.000	0.600	-2515.9
			[0.030]			[0.031]	[1.157]			[0.031]	[13.164]			[0.031]	[1.145]	[13.246]		
		Germany	1.157***	0.633	-2505.8	1.147***	-2.000	0.631	-2501.2	1.161***	6.000	0.633	-2501.0	1.151***	-2.000	6.000	0.631	-2496.2
			[0.032]			[0.033]	[1.478]			[0.032]	[5.203]			[0.033]	[1.557]	[5.027]		
		United Kingdom	0.816***	0.613	-2774.6	0.817***	<0.000	0.613	-2768.5	0.819***	-1.000	0.613	-2768.6	0.820***	<0.000	>0.000	0.612	-2762.5
			[0.027]			[0.028]	[0.840]			[0.027]	[4.985]			[0.027]	[0.841]	[5.389]		
		Italy	1.019***	0.379	-2154.0	1.010***	<0.000	0.378	-2148.1	1.004***	-3.044*	0.378	-2153.8	1.007***	>0.000	-3.355**	0.377	-2148.4
			[0.054]			[0.054]	[0.579]			[0.052]	[1.935]			[0.051]	[0.528]	[1.892]		
		Japan	0.722***	0.253	-2187.0	0.743***	3.274***	0.249	-2190.7	0.721***	-5.000	0.252	-2181.9	0.737***	4.202***	-17.674***	0.246	-2189.9
			[0.044]			[0.039]	[0.666]			[0.043]	[4.935]			[0.038]	[0.771]	[6.397]		
	Asia/ Australasia	Australia	0.620***	0.322	-2472.5	0.625***	-1.531**	0.321	-2468.3	0.619***	-1.000	0.321	-2466.1	0.625***	-1.547**	>0.000	0.319	-2462.1
			[0.037]			[0.035]	[0.754]			[0.037]	[3.602]			[0.035]	[0.765]	[3.417]		
		New Zealand	0.529***	0.152	-2184.6	0.539***	-1.839***	0.150	-2186.0	0.514***	2.439*	0.149	-2179.2	0.540***	-1.774***	1.000	0.148	-2179.6
			[0.047]			[0.036]	[0.630]			[0.044]	[1.655]			[0.036]	[0.641]	[1.491]		
		Hong Kong/China	0.853***	0.259	-2018.8	0.836***	-1.657***	0.256	-2024.4	0.852***	-1.000	0.258	-2013.0	0.829***	-1.661***	-3.391**	0.254	-2019.7
			[0.056]			[0.054]	[0.427]			[0.056]	[2.104]			[0.053]	[0.390]	[2.033]		
		Singapore	0.669***	0.167	-1962.2	0.654***	-1.112***	0.164	-1964.4	0.671***	1.000	0.166	-1956.0	0.654***	-1.111***	>0.000	0.162	-1958.2
			[0.054]			[0.054]	[0.332]			[0.054]	[2.709]			[0.054]	[0.334]	[3.075]		

(Table 5.7 - *Continued*)

Group	Sub-group	Country	Benchmark: ICAPM + EGARCH			Model I: Country Factor				Model II: Industry Factor				Model III: Country Factor + Industry Factor				
			FTSE	Adj. R-sq	BIC	FTSE	CNT	Adj. R-sq	BIC	FTSE	IND	Adj. R-sq	BIC	FTSE	CNT	IND	Adj. R-sq	BIC
ESM	*Advanced*	Brazil	0.946***	0.174	-1416.7	1.152***	-2.057***	0.181	-1476.1	0.999***	4.498**	0.176	-1412.6	1.161***	-2.033***	1.000	0.179	-1470.2
			[0.046]			[0.076]	[0.246]			[0.055]	[2.468]			[0.080]	[0.245]	[2.197]		
		Mexico	1.141***	0.237	-1731.2	1.110***	-2.790***	0.229	-1764.9	1.132***	-1.000	0.234	-1725.2	1.106***	-2.836***	-1.000	0.227	-1759.4
			[0.065]			[0.068]	[0.341]			[0.065]	[1.860]			[0.069]	[0.348]	[1.789]		
		Israel	0.625***	0.144	-1959.3	0.650***	-4.848***	0.127	-1969.5	0.625***	2.000	0.142	-1953.1	0.650***	-4.877***	4.000	0.125	-1963.8
			[0.060]			[0.063]	[0.952]			[0.060]	[4.505]			[0.063]	[0.958]	[5.240]		
		Korea	1.060***	0.171	-1552.9	1.049***	-0.221*	0.169	-1547.9	1.037***	-4.018**	0.168	-1551.7	1.047***	<0.000	-3.443**	0.167	-1545.9
			[0.084]			[0.088]	[0.155]			[0.090]	[1.779]			[0.091]	[0.176]	[1.933]		
		Taiwan/China	0.696***	0.120	-1753.6	0.681***	-0.861**	0.117	-1748.5	0.690***	<0.000	0.118	-1747.4	0.682***	-0.939**	1.000	0.115	-1742.4
			[0.077]			[0.080]	[0.492]			[0.077]	[2.424]			[0.080]	[0.532]	[2.341]		
		South Africa	0.692***	0.173	-1985.7	0.664***	-3.860***	0.164	-2010.7	0.675***	-7.540***	0.171	-1988.7	0.659***	-3.562***	-4.961*	0.163	-2006.6
			[0.058]			[0.056]	[0.539]			[0.055]	[2.413]			[0.056]	[0.538]	[3.167]		
	Asia	India	0.198***	0.013	-1828.4	0.232***	-0.676*	0.012	-1824.9	0.218***	5.000	0.012	-1823.0	0.218***	<0.000	3.000	0.010	-1819.0
			[0.069]			[0.067]	[0.445]			[0.069]	[4.979]			[0.070]	[0.486]	[4.608]		
		Pakistan	0.191**	-0.008	-1507.2	0.182**	-1.339***	-0.011	-1506.9	0.188**	-2.000	-0.010	-1501.7	0.198**	-1.374***	-3.518**	-0.014	-1503.7
			[0.100]			[0.102]	[0.327]			[0.100]	[3.260]			[0.104]	[0.337]	[2.117]		
		China	0.262***	0.003	-1645.3	0.270***	>0.000	0.001	-1639.3	0.260***	<0.000	0.001	-1639.1	0.269***	>0.000	-1.000	-0.001	-1633.1
			[0.080]			[0.080]	[0.387]			[0.082]	[4.576]			[0.082]	[0.392]	[4.762]		
		Indonesia	0.264***	0.002	-900.9	0.312***	-0.516***	0.001	-901.1	0.244***	<0.000	-0.001	-895.0	0.308***	-0.522***	-2.000	-0.002	-895.5
			[0.066]			[0.074]	[0.143]			[0.062]	[2.640]			[0.073]	[0.148]	[2.738]		
		Malaysia	0.344***	0.028	-1784.8	0.333***	-1.940***	0.024	-1798.8	0.339***	4.194*	0.026	-1780.2	0.332***	-2.066***	-2.000	0.022	-1793.2
			[0.060]			[0.057]	[0.311]			[0.060]	[2.797]			[0.056]	[0.319]	[2.780]		
		Philippines	0.435***	0.044	-1178.6	0.468***	-0.907***	0.041	-1176.2	0.403***	-9.813***	0.040	-1177.0	0.423***	-0.924***	-9.337***	0.037	-1175.2
			[0.076]			[0.080]	[0.304]			[0.070]	[3.223]			[0.074]	[0.326]	[3.187]		
		Thailand	0.624***	0.070	-1274.8	0.635***	-0.806***	0.067	-1275.0	0.626***	2.000	0.068	-1269.6	0.628***	-0.795***	<0.000	0.064	-1268.8
			[0.094]			[0.089]	[0.273]			[0.096]	[2.332]			[0.089]	[0.315]	[2.614]		
	Europe	Czech Republic	0.568***	0.098	-1302.5	0.548***	-1.000	0.094	-1296.6	0.569***	-4.515**	0.096	-1299.1	0.560***	-1.000	-4.552**	0.093	-1293.4
			[0.079]			[0.081]	[1.057]			[0.081]	[2.337]			[0.083]	[1.125]	[2.466]		
		Hungary	0.793***	0.219	-1065.5	0.765***	-1.362**	0.214	-1063.8	0.794***	-2.000	0.216	-1060.1	0.793***	-1.514**	-3.000	0.211	-1058.6
			[0.073]			[0.067]	[0.771]			[0.074]	[3.639]			[0.069]	[0.839]	[3.321]		
		Poland	0.761***	0.102	-1631.6	0.757***	<0.000	0.099	-1626.0	0.736***	-7.159***	0.100	-1641.2	0.739***	<0.000	-7.250***	0.097	-1634.8
			[0.074]			[0.075]	[0.308]			[0.069]	[1.561]			[0.069]	[0.353]	[1.577]		
		Turkey	0.872***	0.056	-1086.3	0.799***	-0.726***	0.050	-1084.3	0.863***	4.449*	0.054	-1082.2	0.809***	-0.665***	4.000	0.049	-1079.3
			[0.134]			[0.138]	[0.273]			[0.135]	[2.859]			[0.141]	[0.267]	[3.152]		
		Russia	0.783***	0.077	-696.7	0.732***	-0.702***	0.068	-695.5	0.768***	-3.012**	0.075	-694.8	0.737***	-0.678***	-3.399***	0.067	-708.3
			[0.115]			[0.060]	[0.102]			[0.112]	[1.409]			[0.100]	[0.144]	[1.131]		
	Lat. America	Argentina	0.907***	0.105	-1561.9	0.901***	-2.139***	0.097	-1569.1	0.911***	<0.000	0.103	-1555.7	0.907***	-2.008***	-1.000	0.096	-1563.0
			[0.073]			[0.080]	[0.404]			[0.074]	[2.274]			[0.080]	[0.397]	[2.378]		
		Chile	0.518***	0.126	-2025.6	0.512***	-0.799**	0.123	-2021.5	0.514***	1.000	0.123	-2020.6	0.509***	-0.811**	2.000	0.121	-2016.7
			[0.053]			[0.054]	[0.385]			[0.053]	[1.390]			[0.054]	[0.380]	[1.425]		
		Colombia	0.151**	0.003	-1771.5	0.190***	2.276***	-0.002	-1779.7	0.148**	-6.113*	0.001	-1766.5	0.186***	2.220***	2.000	-0.003	-1773.5
			[0.074]			[0.068]	[0.315]			[0.075]	[3.779]			[0.068]	[0.377]	[4.662]		
		Peru	0.165**	0.014	-1805.1	0.191***	-1.791***	0.013	-1803.9	0.155**	-2.000	0.012	-1799.4	0.182***	-1.724***	-1.000	0.010	-1798.0
			[0.073]			[0.075]	[0.567]			[0.078]	[2.195]			[0.078]	[0.564]	[1.685]		

Table 5.7 (Appendix C.4) and Table 5.8 (Appendix C.5) report regression results for a sample of all 33 countries and two sub-samples consisting of all eleven developed or all 22 emerging markets respectively under a broad (finely-partitioned) industry classification of ten FTSE Economic Groups (39 FTSE Industry Sectors). The mean equation is specified as a standard ICAPM model for both tables (appendices). As is known, the residuals from the ICAPM are interpreted as non-systematic risk. Therefore, with the specification of mean equation as the ICAPM model, this section will examine whether the variance of unsystematic risk component can be effectively captured by two factors specific to the subject country, i.e., a country specific factor and an industry factor specific to that country, along with the ARCH and GARCH components.

Adjusted R^2s in Tables 5.7 and 5.8 indicate that developed markets have higher proportion of the variations in the realized market returns explained by all four models than their emerging counterparts. The magnitude of the adjusted R^2s seems to be decided by the advancedness of the economies. For example, for G7 countries, the adjusted R^2s across four models range from approximately 25 percent for Japan to 85 percent for the U.S., which on average much higher than the markets in "Asia/Australasia" group. As another example, the emerging markets in "Advanced" normally have higher adjusted R^2s than the emerging markets in other "ESM" sub-groups. This evidence indicates that the factors driving the emerging market volatilities are quite different from the factors for developed market volatilities. Unfortunately, for a given country, the differences in adjusted R^2s across four models are so small that it is quite difficult to use adjusted R^2s as an indicator for model selection. As a result, BICs are also reported.

Table 5.7 shows that under a broad industry classification system, every country has significant and positive exposure to the world market factor, as specified in the mean equation of the EGARCH (1, 1) model, across all four model specifications. Interestingly, a closer examination on the magnitude of coefficients for world market factor reveals that they are almost identical to each other for all four model specifications per country. The regression results for the second model specification, in which the variance equation of EGARCH model is augmented by a country factor without leverage effect, show that eight out of 33 countries have insignificant country factor coefficients for the conditional variance. Among them, five are members of G7 developed markets, i.e., Canada, the U.S., Germany, the U.K., and Italy. For those countries with significant coefficients, only Japan has the positive exposure to the country factor. Measured in terms of their absolute values, Israel (-4.848), France (-4.340), South Africa (-3.860), and Japan (3.274) have relatively higher coefficients than other countries. When the industry factor is augmented into the conditional variance equation, thirteen out of 33 countries have significant coefficients. Among them, five countries have positive coefficients, i.e., the U.S. (24.670), New Zealand (2.439), Brazil (4.498), Malaysia (4.194), and Turkey (4.449). The U.S. has the highest (in absolute value) significant exposure to the industry factor. In a three-factor model, there are eleven countries having significant coefficients to industry factor. The U.S. has the highest absolute coefficient (27.020), followed by Japan (-17.674). Six out of the 11 countries, have significant coefficients for country factor, i.e., Japan, Hong Kong/China, South Africa, Pakistan, the Philippines, and Russia. Almost all emerging markets and all four Asian/Australasian countries have significant country coefficients; in contrast, only two G7 countries have the significant country factor coefficients. BICs indicate that the effectiveness of four model specifications for all 33 countries is almost identical to each other. If the negative industry (country) risk premium is interpreted as bad news specific to the industry (country) involved,[71] the negative signs for most of estimated factor coefficients seem correct in that by intuition, negative industry (country) news induces increases in variations of country returns. For some of the 33 sample markets, good industry news (positive signs) also increases the country variations, especially the U.S., which has the highest (measured in absolute values) and positive exposures to industry factor.

With a finely portioned industry classification, regression results in Appendix C.4 almost resemble to Table 5.7, for example, BICs and the coefficients of the world market factor for each model per country. The estimated coefficients for industry factor, on average, have increased in their absolute magnitude, though some countries have dropped in significance in the industry factor relative to Table 5.7, such as New Zealand. These results are expected because the industry factor is stronger within a finely partitioned industry classification than the case within a broad one.

[71] This assumption follows the interpretation of leverage effect defined in the EGARCH model, in which negative errors from the mean equation are interpreted as bad news and they are expected to have asymmetric impact on the volatility of returns.

Table 5.8

Impact of Value-Weighted [Cumulative] Industry (Ten FTSE Economic Groups) and Country Factors in Variance of Residuals from ICAPM Model, An EGARCH (1, 1) Model without Leverage Effect, Sub-Samples of Developed and Emerging [Stock] Markets (January 1994 – June 2003)

This table reports the estimated coefficients for each factor, i.e., a world market factor (FTSE), a country factor (CNT) and a value-weighted cumulative industry factor (IND), from the EGARCH regression model for each country. Standard errors are reported for each coefficient in square brackets, along with some model specification diagnostics. The mean equation is specified as an ICAPM model: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t}$; and the conditional variance equations are specified as three augmented EGARCH(1,1) processes without leverage effect. They are: Model I: $\text{EGARCH}(1,1) + [\text{Country Factor}]_{k,t}$;Model II: $\text{EGARCH}(1,1) + [\text{Industry Factor}]_{k,t}$; and, Model III: $\text{EGARCH}(1,1) + [\text{Country Factor}]_{k,t} + [\text{Industry Factor}]_{k,t}$, with the assumption that the residuals from the mean equation follow a normal distribution. An EGARCH(1,1) without the leverage effect is used as the reference model and is reported under column "Benchmark: ICAPM + EGARCH." r_k (r_{FTSE}) is the weekly excess return of country k (a world market portfolio) above a one-week Eurodollar deposit rate; country and value-weighted industry factors are estimated from a dummy variable regression model of Heston and Rouwenhorst (1994) via industry returns on all available FTSE Economic Group indices in two sub-samples of markets. Panel A reports the regression results for a sub-sample of developed markets (11); and, Panel B for a sub-sample of emerging markets (22). Capital-weights are computed by using market capitalization at the beginning of the synthetic week (Wednesday-to-Wednesday) for each available Economic Group index within each market. Both adjusted R^2s and Schwartz Bayesian Information Criterion (BIC) is also provided along with each model to compare the effectiveness of four model specifications. Significance at the 1% level is denoted by ***, at the 5% level by **, and at the 10% level by *.

Panel A: Developed Markets Only

Group	Sub-group	Country	Benchmark: ICAPM + EGARCH			Model I: Country Factor				Model II: Industry Factor				Model III: Country Factor + Industry Factor				
			FTSE	Adj. R-sq	BIC	FTSE	CNT	Adj. R-sq	BIC	FTSE	IND	Adj. R-sq	BIC	FTSE	CNT	IND	Adj. R-sq	BIC
DSM	G7	Canada	0.883***	0.579	-2666.5	0.882***	-1.000	0.578	-2660.6	0.889***	-12.237***	0.579	-2667.0	0.888***	-1.000	-12.453***	0.578	-2660.8
			[0.031]			[0.033]	[1.046]			[0.031]	[4.698]			[0.032]	[1.075]	[5.104]		
		United States	1.059***	0.857	-3208.5	1.060***	-4.000	0.857	-3202.9	1.061***	18.528*	0.857	-3203.7	1.060***	-7.776*	25.879*	0.856	-3199.2
			[0.018]			[0.018]	[4.837]			[0.018]	[14.011]			[0.017]	[5.203]	[15.750]		
		France	1.036***	0.603	-2520.6	1.027***	-3.883***	0.601	-2521.0	1.025***	16.870**	0.601	-2517.1	1.022***	-3.649***	18.946**	0.600	-2518.3
			[0.030]			[0.031]	[1.080]			[0.030]	[8.846]			[0.032]	[1.079]	[9.132]		
		Germany	1.157***	0.633	-2505.8	1.143***	-2.728**	0.631	-2502.8	1.154***	<0.000	0.632	-2499.6	1.147***	-2.897**	2.000	0.630	-2496.8
			[0.032]			[0.033]	[1.435]			[0.032]	[4.089]			[0.033]	[1.431]	[3.812]		
		United Kingdom	0.816***	0.613	-2774.6	0.817***	<0.000	0.613	-2768.4	0.823***	-4.000	0.613	-2769.1	0.821***	<0.000	-4.000	0.612	-2763.2
			[0.027]			[0.027]	[0.870]			[0.027]	[3.738]			[0.027]	[0.844]	[3.765]		
		Italy	1.019***	0.379	-2154.0	1.009***	1.220**	0.378	-2150.9	1.019***	1.000	0.378	-2147.9	1.009***	1.316**	<0.000	0.376	-2145.0
			[0.054]			[0.052]	[0.636]			[0.054]	[2.357]			[0.050]	[0.643]	[2.186]		
		Japan	0.722***	0.253	-2187.0	0.754***	4.476***	0.248	-2193.2	0.724***	-14.006**	0.252	-2185.0	0.754***	4.200***	-6.000	0.247	-2187.5
			[0.044]			[0.040]	[0.797]			[0.042]	[6.805]			[0.040]	[0.813]	[8.866]		
	Asia/ Australasia	Australia	0.620***	0.322	-2472.5	0.626***	-2.530***	0.320	-2472.9	0.628***	-2.000	0.321	-2466.9	0.624***	-3.664***	-3.000	0.318	-2468.1
			[0.037]			[0.034]	[0.928]			[0.037]	[2.165]			[0.037]	[1.156]	[3.130]		
		New Zealand	0.529***	0.152	-2184.6	0.534***	-1.589***	0.149	-2183.1	0.500***	2.795***	0.149	-2185.7	0.526***	-1.347***	1.292*	0.147	-2173.7
			[0.047]			[0.036]	[0.560]			[0.043]	[0.837]			[0.034]	[0.564]	[0.886]		
		Hong Kong/China	0.853***	0.259	-2018.8	0.841***	-1.783***	0.256	-2024.8	0.856***	3.000	0.258	-2013.9	0.840***	-1.981***	-2.000	0.255	-2019.0
			[0.056]			[0.055]	[0.441]			[0.056]	[2.367]			[0.055]	[0.494]	[2.999]		
		Singapore	0.669***	0.167	-1962.2	0.666***	-1.676***	0.164	-1965.8	0.671***	-5.335***	0.166	-1960.5	0.666***	-1.645***	-6.009***	0.163	-1965.1
			[0.054]			[0.053]	[0.479]			[0.056]	[2.175]			[0.053]	[0.442]	[2.167]		

Panel B: Emerging Markets Only

Group	Sub-group	Country	Benchmark: ICAPM + EGARCH			Model I: Country Factor				Model II: Industry Factor				Model III: Country Factor + Industry Factor				
			FTSE	Adj. R-sq	BIC	FTSE	CNT	Adj. R-sq	BIC	FTSE	IND	Adj. R-sq	BIC	FTSE	CNT	IND	Adj. R-sq	BIC
ESM	Advanced	Brazil	0.946***	0.174	-1416.7	1.160***	-1.993***	0.183	-1458.8	1.022***	7.513**	0.178	-1413.9	1.172***	-2.022***	2.000	0.181	-1452.8
			[0.046]			[0.072]	[0.263]			[0.069]	[3.285]			[0.080]	[0.272]	[3.016]		
		Mexico	1.141***	0.237	-1731.2	1.149***	-2.445***	0.233	-1745.4	1.115***	-2.301*	0.234	-1726.3	1.145***	-2.460***	-2.000	0.231	-1740.1
			[0.065]			[0.068]	[0.360]			[0.066]	[1.725]			[0.069]	[0.399]	[2.706]		
		Israel	0.625***	0.144	-1959.3	0.660***	-2.831***	0.138	-1962.0	0.626***	<0.000	0.142	-1953.1	0.660***	-2.952***	4.000	0.136	-1956.7
			[0.060]			[0.062]	[0.774]			[0.060]	[3.317]			[0.062]	[0.794]	[4.550]		
		Korea	1.060***	0.171	-1552.9	1.046***	<0.000	0.168	-1547.3	1.047***	-3.501**	0.168	-1550.4	1.046***	<0.000	-3.392**	0.167	-1544.5
			[0.084]			[0.086]	[0.197]			[0.088]	[1.772]			[0.089]	[0.226]	[1.852]		
		Taiwan/China	0.696***	0.120	-1753.6	0.693***	<0.000	0.118	-1747.5	0.694***	<0.000	0.118	-1747.5	0.690***	>0.000	-1.000	0.116	-1741.4
			[0.077]			[0.077]	[0.563]			[0.078]	[2.069]			[0.078]	[0.581]	[2.085]		
		South Africa	0.692***	0.173	-1985.7	0.693***	-1.341**	0.171	-1982.1	0.675***	-5.815**	0.171	-1982.9	0.683***	-1.085**	-4.000	0.169	-1977.7
			[0.058]			[0.059]	[0.616]			[0.056]	[2.961]			[0.057]	[0.628]	[3.448]		
	Asia	India	0.198***	0.013	-1828.4	0.211***	>0.000	0.012	-1821.7	0.226***	5.128*	0.012	-1824.9	0.224***	>0.000	5.825*	0.010	-1818.4
			[0.069]			[0.069]	[0.574]			[0.070]	[3.885]			[0.070]	[0.579]	[4.034]		
		Pakistan	0.191**	-0.008	-1507.2	0.193**	-0.914***	-0.009	-1503.4	0.188**	>0.000	-0.010	-1501.0	0.192**	-0.907**	<0.000	-0.011	-1497.2
			[0.100]			[0.098]	[0.384]			[0.099]	[4.133]			[0.099]	[0.390]	[3.979]		
		China	0.262***	0.003	-1645.3	0.255***	1.105***	0.001	-1642.8	0.261***	-1.000	0.001	-1639.1	0.263***	1.090***	-2.000	-0.001	-1636.7
			[0.080]			[0.080]	[0.393]			[0.080]	[3.688]			[0.079]	[0.400]	[3.698]		
		Indonesia	0.264***	0.002	-900.9	0.304***	-0.556***	0.001	-900.7	0.256***	1.000	-0.001	-895.3	0.303***	-0.554***	1.000	-0.002	-895.0
			[0.066]			[0.073]	[0.160]			[0.069]	[2.704]			[0.076]	[0.162]	[2.705]		
		Malaysia	0.344***	0.028	-1784.8	0.335***	-0.852***	0.026	-1781.6	0.344***	-1.000	0.026	-1778.7	0.335***	-0.839***	<0.000	0.024	-1775.3
			[0.060]			[0.058]	[0.329]			[0.060]	[2.438]			[0.058]	[0.331]	[2.253]		
		Philippines	0.435***	0.044	-1178.6	0.445***	-0.848**	0.041	-1174.7	0.397***	-12.222***	0.039	-1180.2	0.405***	-0.579*	-10.882***	0.037	-1175.4
			[0.076]			[0.079]	[0.377]			[0.072]	[2.924]			[0.074]	[0.420]	[3.104]		
		Thailand	0.624***	0.070	-1274.8	0.622***	-0.898***	0.066	-1275.4	0.628***	3.000	0.068	-1269.6	0.627***	-0.884***	2.000	0.065	-1270.0
			[0.094]			[0.085]	[0.297]			[0.095]	[2.512]			[0.087]	[0.301]	[2.735]		
	Europe	Czech Republic	0.568***	0.098	-1302.5	0.585***	1.000	0.095	-1297.8	0.569***	-2.000	0.096	-1297.2	0.580***	1.998*	3.000	0.092	-1293.4
			[0.079]			[0.081]	[1.486]			[0.082]	[3.323]			[0.083]	[1.372]	[4.437]		
		Hungary	0.793***	0.219	-1065.5	0.800***	-1.000	0.216	-1061.0	0.791***	-6.000	0.217	-1061.6	0.802***	-1.000	-6.000	0.214	-1056.7
			[0.073]			[0.074]	[0.721]			[0.071]	[5.102]			[0.073]	[0.690]	[5.463]		
		Poland	0.761***	0.102	-1631.6	0.761***	<0.000	0.100	-1625.4	0.750***	-6.961***	0.099	-1638.7	0.746***	<0.000	-6.949***	0.097	-1632.4
			[0.074]			[0.074]	[0.325]			[0.071]	[1.525]			[0.071]	[0.367]	[1.551]		
		Turkey	0.872***	0.056	-1086.3	0.808***	-0.971***	0.050	-1086.1	0.854***	2.000	0.054	-1081.0	0.814***	-0.932***	2.000	0.049	-1080.2
			[0.134]			[0.137]	[0.308]			[0.136]	[2.698]			[0.136]	[0.301]	[3.193]		
		Russia	0.783***	0.077	-696.7	0.776***	-1.041***	0.073	-712.6	0.782***	-4.465***	0.077	-697.6	0.748***	-0.836***	-3.551***	0.068	-708.2
			[0.115]			[0.089]	[0.131]			[0.109]	[1.394]			[0.098]	[0.174]	[1.166]		
	Lat. America	Argentina	0.907***	0.105	-1561.9	0.940***	-1.897***	0.099	-1564.4	0.912***	<0.000	0.103	-1555.7	0.931***	-2.000***	-2.000	0.098	-1558.5
			[0.073]			[0.077]	[0.486]			[0.075]	[2.998]			[0.078]	[0.484]	[2.773]		
		Chile	0.518***	0.126	-2025.6	0.511***	1.290**	0.124	-2024.4	0.512***	2.000	0.123	-2020.5	0.511***	1.247**	>0.000	0.122	-2018.3
			[0.053]			[0.052]	[0.621]			[0.054]	[1.636]			[0.052]	[0.661]	[1.729]		
		Colombia	0.151**	0.003	-1771.5	0.192***	2.423***	-0.001	-1779.9	0.147**	-4.000	0.001	-1765.9	0.185***	2.496***	1.000	-0.003	-1773.8
			[0.074]			[0.070]	[0.357]			[0.075]	[3.588]			[0.070]	[0.397]	[4.120]		
		Peru	0.165**	0.014	-1805.1	0.169***	-1.000	0.013	-1800.0	0.153**	-3.890*	0.011	-1800.7	0.157**	<0.000	-4.000	0.010	-1794.9
			[0.073]			[0.072]	[0.663]			[0.074]	[2.740]			[0.074]	[0.738]	[2.890]		

It is surprising to see that only a handful of developed markets have significant industry coefficients in Table 5.7. By tuition, since these developed markets are both financially and economically integrated with each as well as with world capital market, local factors, such as country factor, should be less important than factors with a global outlook, like global industry factors. One possibility may be that the industry factor, as estimated from a sample including emerging markets, has been under-estimated relative to country factors. In other words, the industries in these emerging markets are more sensitive to factors specific to the domicile countries than the global industry innovations; therefore, global industry factors play a considerably less important role in these industries in emerging markets and they tend to be over-smoothed by the less responsiveness of those industries located in emerging markets to global factors.

In order to provide a clearer picture of each factor in explaining the conditional variations of country returns, the EGARCH regression has been re-estimated on two sub-samples consisting of 11 developed and 22 emerging markets. Table 5.8 (Appendix C.5) provides the re-estimation results. As expected, in Panel A, the number of developed markets with significant industry factor coefficients has increased from 4 (in Table 5.7) to 6, when only the industry factor is considered. The absolute magnitude of coefficients has also been increased in most developed markets and the U.S. has the highest absolute coefficient, about 18.528. (The magnitude of industry coefficient of the U.S., however, has decreased, from 24.670 to 18.528.[72]) One of the interesting features of G7 countries in Panel A is that those countries with significant exposures to the industry factor have more homogenous coefficients, as measured in their absolute values, than they are in Table 5.7. This evidence may support the fact that industry innovations from most industrialized countries, i.e., G7 countries, have more profound impact on developed markets than those industry innovations sourced from a mix of developed and emerging markets. In a three-factor model, the number of countries with significant country coefficients has also increased relative to Table 5.7; and four out of the 11 developed markets have both significant country and industry coefficients, i.e., the U.S., France, New Zealand, and Singapore.

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[72] This result may reflect the fact that industries in the U.S. are less industrially concentrated and most of them dominate the industries located in other countries in terms of their market capitalization; hence, the industry factor computed from a sample including both developed and emerging markets are more reflective of the industry innovations in the U.S. rather than those from other countries. As a result, the industry coefficient for the U.S. in Table 21 is larger in its magnitude that it is in Table 22.

In Panel B of Table 5.8, on the other hand, the number of the emerging markets with significant industry coefficients has declined for both two- and three-factor models. Their absolute values are more heterogeneous than those of developed markets; among them, Malaysia has the highest industry exposure, about -12.222.

With a disaggregate industry classification, Panel A of Appendix C.5 shows that the number of countries has significant industry coefficients has declined relative to Appendix C.4 and Table 5.8. The U.S. still has the highest industry coefficient but not significant at all. At a first glance, those regression results are contrary to the intuition.

One possibility for the insignificant results is that the proxy, capital-weighting individual global industry factors by their respective market capitalizations in a country at the beginning of the synthetic week (Wednesday-to-Wednesday), may be misspecified. Some of industry innovations thereby have been masked. On the other hand, these results may reflect the possibility that industries do have different performance across countries during the sample period. When measured on a finely-partitioned industry classification system, industry innovations may be over-smoothed relative to a broad version due to the dummy variable regression model. Similar patterns are also present in Panel B of Appendix C.5 within a sub-sample of 22 emerging markets.

The use of EGARCH model also allows examining the well-documented leverage effect in association with industry and country effects in explaining the conditional variance of the residuals from the ICAPM model. Table 5.9 (Appendix C.6) presents the regression results for all 33 sample markets.

Table 5.9

Impact of Value-Weighted [Cumulative] Industry (Ten FTSE Economic Groups) and Country Factors in Variance of Residuals from ICAPM Model, An EGARCH (1, 1) Model with Leverage Effect, All Sample [Stock] Markets (January 1994 – June 2003)

This table reports the estimated coefficients for each factor, i.e., a world market factor (FTSE), a country factor (CNT) and a value-weighted [cumulative] industry factor (IND), from the EGARCH regression model for each country. Standard errors are reported for each coefficient in square brackets, along with some model specification diagnostics. The mean equation is specified as an ICAPM model: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t}$; and, variance equations are specified as three augmented EGARCH(1,1) processes without leverage effect. They are: Model I: EGARCH(1,1) + LEV + $[\text{Country Factor}]_{k,t}$; Model II: EGARCH(1,1) + LEV + $[\text{Industry Factor}]_{k,t}$; and, Model III: EGARCH(1,1) + LEV $+[\text{Country Factor}]_{k,t} + [\text{Industry Factor}]_{k,t}$, with the assumption that the residuals from the mean equation follow a normal distribution. An EGARCH (1, 1) with the leverage effect is used as the reference model and is reported under column "Benchmark: ICAPM + EGARCH + LEV." r_k (r_{FTSE}) is the weekly excess return of country k (a world market portfolio) above a one-week Eurodollar deposit rate; country and value-weighted industry factors are estimated from a dummy variable regression model of Heston and Rouwenhorst (1994) via industry returns on all available FTSE Economic Group indices in all sample markets (33). Capital-weights are computed by using market capitalization at the beginning of the synthetic week (Wednesday-to-Wednesday) for each available Economic Group index within each market. Both adjusted R^2s and Schwartz Bayesian Information Criterion (BIC) is also provided along with each model to compare the effectiveness of four model specifications. Significance at the 1% level is denoted by ***, at the 5% level by **, and at the 10% level by *.

Group	Sub-group	Country	Benchmark: ICAPM + EGARCH +LEV				Model I: Country Factor					Model II: Industry Factor					Model III: Country Factor + Industry Factor					
			FTSE	LEV	Adj. R-sq	BIC	FTSE	LEV	CNT	Adj. R-sq	BIC	FTSE	LEV	IND	Adj. R-sq	BIC	FTSE	LEV	CNT	IND	Adj. R-sq	BIC
DSM	G7	Canada	0.880***	<0.000	0.578	-2661.1	0.881***	<0.000	1.000	0.578	-2655.2	0.880***	<0.000	-2.000	0.578	-2655.1	0.881***	<0.000	1.000	-3.000	0.577	-2649.8
			[0.032]	[0.128]			[0.032]	[0.166]	[1.238]			[0.032]	[0.135]	[3.860]			[0.032]	[0.181]	[1.236]	[3.750]		
		United States	1.056***	0.884*	0.857	-3214.0	1.055***	1.000	-12.865***	0.855	-3212.4	1.057***	0.896*	3.000	0.856	-3208.0	1.057***	1.000	-14.252***	17.000	0.854	-3206.5
			[0.017]	[0.645]			[0.018]	[0.773]	[5.075]			[0.017]	[0.662]	[12.298]			[0.018]	[0.876]	[5.596]	[18.117]		
		France	1.039***	-0.487*	0.602	-2516.8	1.035***	<0.000	-4.179***	0.601	-2515.7	1.034***	-0.448*	8.000	0.601	-2510.9	1.026***	<0.000	-3.985***	7.000	0.599	-2509.8
			[0.032]	[0.316]			[0.033]	[0.305]	[1.193]			[0.033]	[0.313]	[15.099]			[0.033]	[0.294]	[1.176]	[14.657]		
		Germany	1.159***	<0.000	0.633	-2500.5	1.150***	<0.000	-1.000	0.631	-2495.4	1.160***	<0.000	6.000	0.632	-2495.3	1.152***	<0.000	-2.000	5.000	0.630	-2490.3
			[0.032]	[0.121]			[0.033]	[0.124]	[1.559]			[0.032]	[0.125]	[5.435]			[0.033]	[0.126]	[1.601]	[5.324]		
		United Kingdom	0.808***	-0.952**	0.611	-2777.1	0.808***	-0.965**	>0.000	0.611	-2770.9	0.804***	-0.922**	>0.000	0.610	-2770.9	0.804***	-0.922**	>0.000	<0.000	0.609	-2764.7
			[0.028]	[0.550]			[0.028]	[0.558]	[0.888]			[0.027]	[0.556]	[5.982]			[0.027]	[0.556]	[0.947]	[6.520]		
		Italy	1.034***	0.407*	0.377	-2154.7	1.043***	0.673**	-1.217**	0.375	-2149.2	1.012***	0.634*	-3.962**	0.376	-2154.7	1.022***	0.819*	-0.912*	-3.911**	0.374	-2147.9
			[0.054]	[0.258]			[0.054]	[0.366]	[0.669]			[0.052]	[0.413]	[1.861]			[0.053]	[0.526]	[0.707]	[2.044]		
		Japan	0.678***	-0.514***	0.250	-2191.5	0.695***	-0.785***	3.881***	0.243	-2200.1	0.682***	-0.573***	-8.678**	0.249	-2187.5	0.687***	-1.000***	5.307***	-20.360***	0.233	-2205.4
			[0.039]	[0.121]			[0.039]	[0.209]	[0.682]			[0.039]	[0.153]	[4.821]			[0.033]	[0.294]	[0.839]	[6.078]		
	Asia/ Australasia	Australia	0.615***	-1.000	0.321	-2471.7	0.614***	-1.000	>0.000	0.319	-2465.0	0.615***	-1.000	-1.000	0.319	-2465.5	0.615***	-1.000	>0.000	-1.000	0.318	-2459.2
			[0.039]	[1.621]			[0.040]	[1.949]	[1.056]			[0.039]	[1.674]	[3.938]			[0.040]	[1.745]	[1.125]	[4.173]		
		New Zealand	0.528***	<0.000	0.150	-2183.6	0.539***	<0.000	-1.458*	0.148	-2176.6	0.528***	<0.000	>0.000	0.148	-2177.5	0.540***	<0.000	-1.459*	>0.000	0.146	-2170.6
			[0.043]	[0.372]			[0.036]	[0.860]	[0.899]			[0.043]	[0.398]	[1.692]			[0.036]	[0.893]	[0.898]	[1.432]		
		Hong Kong/China	0.829***	-0.391***	0.257	-2019.3	0.823***	-0.231*	-1.271***	0.255	-2020.0	0.833***	-0.404***	-1.000	0.256	-2013.4	0.820***	<0.000	-1.286***	-2.961*	0.253	-2015.2
			[0.057]	[0.163]			[0.055]	[0.166]	[0.444]			[0.056]	[0.167]	[2.082]			[0.053]	[0.196]	[0.436]	[2.126]		
		Singapore	0.644***	-0.467**	0.164	-1964.9	0.647***	<0.000	-0.637*	0.162	-1960.7	0.644***	-0.463**	>0.000	0.162	-1958.7	0.648***	<0.000	-0.620*	<0.000	0.161	-1954.6
			[0.054]	[0.210]			[0.054]	[0.224]	[0.452]			[0.054]	[0.210]	[2.626]			[0.054]	[0.230]	[0.449]	[2.911]		

(Table 5.9 - *Continued*)

Group	Sub-group	Country	Benchmark: ICAPM + EGARCH +LEV				Model I: Country Factor					Model II: Industry Factor					Model III: Country Factor + Industry Factor					
			FTSE	LEV	Adj. R-sq	BIC	FTSE	LEV	CNT	Adj. R-sq	BIC	FTSE	LEV	IND	Adj. R-sq	BIC	FTSE	LEV	CNT	IND	Adj. R-sq	BIC
ESM	Advanced	Brazil	1.004***	-0.917***	0.179	-1436.1	1.152***	-0.313**	-1.748***	0.181	-1473.6	1.013***	-0.914***	>0.000	0.178	-1429.9	1.150***	-0.318**	-1.744***	<0.000	0.179	-1467.5
			[0.051]	[0.245]			[0.078]	[0.151]	[0.233]			[0.054]	[0.254]	[2.178]			[0.079]	[0.178]	[0.238]	[2.426]		
		Mexico	1.056***	-1.000***	0.235	-1755.3	1.097***	-0.566**	-2.215***	0.231	-1761.4	1.093***	-1.000*	-3.386***	0.235	-1733.2	1.074***	-0.754**	-2.088***	-2.552*	0.228	-1757.0
			[0.063]	[0.333]			[0.067]	[0.313]	[0.414]			[0.070]	[0.685]	[1.420]			[0.067]	[0.401]	[0.433]	[1.771]		
		Israel	0.622***	-0.476*	0.143	-1955.0	0.648***	<0.000	-4.805***	0.126	-1963.4	0.622***	-0.448*	3.000	0.141	-1949.0	0.648***	<0.000	-4.858***	4.000	0.123	-1957.5
			[0.061]	[0.305]			[0.063]	[0.376]	[0.961]			[0.061]	[0.302]	[5.338]			[0.063]	[0.355]	[0.958]	[5.413]		
		Korea	1.037***	-0.469***	0.166	-1557.3	1.026***	-0.464***	>0.000	0.164	-1551.0	1.017***	-0.523***	-3.077***	0.164	-1557.9	1.026***	-0.613***	>0.000	-3.545***	0.161	-1552.5
			[0.089]	[0.180]			[0.091]	[0.196]	[0.200]			[0.096]	[0.219]	[1.291]			[0.094]	[0.259]	[0.237]	[1.411]		
		Taiwan/China	0.672***	-0.307**	0.117	-1749.9	0.676***	<0.000	<0.000	0.116	-1743.7	0.668***	-0.343*	1.000	0.115	-1743.9	0.676***	<0.000	<0.000	1.000	0.114	-1737.8
			[0.078]	[0.183]			[0.080]	[0.261]	[0.763]			[0.078]	[0.222]	[2.310]			[0.079]	[0.278]	[0.762]	[2.357]		
		South Africa	0.695***	-0.769***	0.171	-1989.9	0.663***	>0.000	-4.039***	0.162	-2004.9	0.675***	-0.858**	-6.063**	0.169	-1989.3	0.657***	>0.000	-3.882***	-4.973*	0.160	-2000.9
			[0.059]	[0.284]			[0.056]	[0.263]	[0.647]			[0.057]	[0.384]	[2.700]			[0.055]	[0.271]	[0.690]	[3.166]		
	Asia	India	0.214***	-0.443***	0.011	-1829.1	0.209***	-0.453**	>0.000	0.009	-1822.9	0.211***	-0.479***	3.000	0.009	-1823.9	0.212***	-0.496**	>0.000	3.000	0.007	-1817.4
			[0.069]	[0.184]			[0.070]	[0.201]	[0.660]			[0.070]	[0.200]	[4.465]			[0.069]	[0.221]	[0.668]	[4.614]		
		Pakistan	0.187**	-0.170*	-0.010	-1502.4	0.184**	>0.000	-1.408***	-0.014	-1500.8	0.199**	-0.260**	-3.646*	-0.012	-1498.1	0.189**	>0.000	-1.389***	-3.290*	-0.016	-1497.5
			[0.103]	[0.114]			[0.102]	[0.184]	[0.431]			[0.107]	[0.130]	[2.453]			[0.105]	[0.217]	[0.476]	[2.355]		
		China	0.259***	<0.000	0.001	-1639.6	0.260***	-0.130*	0.756*	-0.001	-1634.8	0.257***	<0.000	>0.000	-0.001	-1633.4	0.259***	-0.130*	0.720*	>0.000	-0.003	-1628.6
			[0.080]	[0.071]			[0.079]	[0.090]	[0.479]			[0.081]	[0.071]	[4.515]			[0.081]	[0.091]	[0.488]	[4.669]		
		Indonesia	0.294***	-0.245**	0.002	-898.2	0.313***	<0.000	-0.469**	-0.002	-895.2	0.295***	-0.259**	-1.000	0.000	-892.5	0.312***	<0.000	-0.500**	-2.000	-0.005	-889.7
			[0.074]	[0.124]			[0.077]	[0.175]	[0.239]			[0.075]	[0.132]	[2.669]			[0.077]	[0.176]	[0.244]	[2.725]		
		Malaysia	0.312***	-0.727***	0.028	-1815.2	0.307***	-0.669***	<0.000	0.025	-1809.2	0.300***	-0.949***	-6.298**	0.025	-1811.5	0.296***	-0.845***	<0.000	-6.332**	0.023	-1805.6
			[0.061]	[0.148]			[0.061]	[0.157]	[0.296]			[0.060]	[0.289]	[3.154]			[0.061]	[0.279]	[0.305]	[3.169]		
		Philippines	0.438***	-0.332***	0.042	-1179.3	0.454***	-0.256**	-0.463*	0.039	-1174.2	0.368***	-0.472***	-11.874***	0.035	-1182.2	0.393***	-0.414***	<0.000	-11.460***	0.034	-1176.3
			[0.078]	[0.116]			[0.078]	[0.124]	[0.320]			[0.068]	[0.133]	[2.733]			[0.068]	[0.152]	[0.353]	[2.818]		
		Thailand	0.637***	-0.456**	0.071	-1277.0	0.636***	-0.420*	<0.000	0.068	-1270.9	0.637***	-0.456**	<0.000	0.069	-1270.9	0.636***	-0.420*	<0.000	>0.000	0.066	-1264.8
			[0.083]	[0.235]			[0.083]	[0.288]	[0.493]			[0.083]	[0.243]	[2.570]			[0.083]	[0.289]	[0.503]	[2.663]		
	Europe	Czech Republic	0.577***	-1.000	0.095	-1298.0	0.570***	-1.000	<0.000	0.092	-1292.3	0.570***	-1.000	-2.000	0.093	-1293.7	0.561***	-1.000	-1.000	-2.000	0.089	-1288.1
			[0.081]	[3.667]			[0.083]	[3.578]	[1.206]			[0.080]	[4.047]	[2.797]			[0.082]	[3.853]	[1.089]	[2.898]		
		Hungary	0.782***	-1.000	0.216	-1067.5	0.783***	-1.000	>0.000	0.213	-1061.8	0.779***	-1.000	-5.808*	0.214	-1060.0	0.782***	-1.000	-1.000	-6.035*	0.210	-1054.8
			[0.075]	[0.805]			[0.077]	[0.873]	[1.215]			[0.076]	[1.548]	[3.994]			[0.077]	[1.898]	[1.279]	[3.952]		
		Poland	0.762***	-0.444***	0.101	-1631.5	0.771***	-0.624***	>0.000	0.099	-1626.0	0.745***	-0.598**	-6.836***	0.098	-1638.7	0.753***	-1.000**	0.804**	-5.835***	0.097	-1633.2
			[0.073]	[0.171]			[0.072]	[0.231]	[0.411]			[0.067]	[0.332]	[1.591]			[0.065]	[0.579]	[0.412]	[1.409]		
		Turkey	0.849***	>0.000	0.053	-1080.3	0.780***	0.558**	-1.380***	0.039	-1083.6	0.846***	>0.000	4.523**	0.051	-1076.4	0.796***	0.636**	-1.397***	4.725*	0.037	-1079.0
			[0.136]	[0.143]			[0.145]	[0.307]	[0.336]			[0.138]	[0.151]	[2.741]			[0.146]	[0.337]	[0.347]	[3.000]		
		Russia	0.827***	-1.000	0.079	-701.4	0.759***	-1.000	-0.542***	0.069	-698.4	0.773***	-1.000	-2.343**	0.074	-690.5	0.723***	<0.000	-0.862***	-4.915***	0.061	-698.4
			[0.117]	[0.949]			[0.074]	[17.007]	[0.204]			[0.101]	[1.035]	[1.153]			[0.084]	[0.713]	[0.258]	[1.124]		
	Lat. America	Argentina	0.906***	-0.229***	0.103	-1558.6	0.911***	>0.000	-2.249***	0.093	-1563.5	0.902***	-0.222***	-1.000	0.102	-1552.5	0.911***	>0.000	-2.247***	-1.000	0.091	-1557.3
			[0.081]	[0.084]			[0.080]	[0.112]	[0.447]			[0.081]	[0.085]	[2.157]			[0.081]	[0.114]	[0.451]	[2.382]		
		Chile	0.503***	-0.310***	0.123	-2025.2	0.513***	-0.305**	<0.000	0.122	-2019.3	0.513***	-0.279***	>0.000	0.122	-2019.0	0.514***	-0.298**	<0.000	>0.000	0.120	-2013.3
			[0.055]	[0.117]			[0.053]	[0.132]	[0.530]			[0.054]	[0.115]	[1.503]			[0.054]	[0.135]	[0.531]	[1.508]		
		Colombia	0.161**	-0.190**	0.002	-1767.3	0.199***	-0.301***	2.448***	-0.005	-1778.9	0.162**	-0.236**	-8.509**	0.000	-1763.5	0.179**	-1.000***	2.072***	-4.000	-0.004	-1764.2
			[0.076]	[0.098]			[0.070]	[0.109]	[0.346]			[0.076]	[0.109]	[4.275]			[0.082]	[0.278]	[0.502]	[3.291]		
		Peru	0.173***	-0.436**	0.014	-1805.8	0.183***	-0.317*	-1.000	0.012	-1800.0	0.164**	-0.427**	-1.000	0.011	-1800.0	0.168**	-0.329*	-1.000	-1.000	0.009	-1794.3
			[0.072]	[0.195]			[0.075]	[0.198]	[0.703]			[0.075]	[0.190]	[1.619]			[0.079]	[0.202]	[0.701]	[1.716]		

Table 5.9 shows that not all countries have significant leverage coefficients across four model specifications. The number of and the magnitude (in absolute value) of significant coefficients for the leverage effect have declined, when the conditional variance equation is augmented by country factor. By contrast, in another version of two-factor model in which an industry factor in included, the number of and the magnitude (in absolute value) of leverage coefficients are almost identical to those in the benchmark model. In that model specification, 13 out of the 33 countries have significant industry coefficients. Both versions of two-factor models suggest that the country factor may be an important source of variations of country returns relative to industry factor. When taking account of country factor, leverage effect loses its importance to the country factor in most of 33 sample countries. When three factors are considered along with the leverage effect, the regression results for each factor are similar to the results of two-factor models where industry and country factors are considered alone. Moreover, compared with Table 5.7, BICs reported in Table 5.9 do not improve a lot as expected. Regression results in Appendix C.6 demonstrate that the absolute magnitude of coefficients for the industry factor (leverage effect) has increased (decreased) but the number of countries with significant exposure to the industry factor has, however, declined. The country coefficients, on the other hand, are almost identical to those in Table 5.9 and the countries with significant coefficients also vary.

Table 5.10 (Appendix C.7) provides an insightful analysis on two sub-samples where 11 developed and 22 emerging markets are considered individually. In Panel A, regression results for a two-factor model including the industry factor suggest that most of 11 developed markets have increased exposures to the industry factor strictly estimated from developed markets with expected signs. Again, the U.S. has the highest exposures to the industry factor of 20.838, followed by France, 15.416. BICs also indicate a marginal gain in the effectiveness of the model. Three-factor model also generates the similar pattern for industry factor. Coefficients for country factor, however, only have marginally increased in their absolute magnitude. This result is also robust to a refined version of industry classification as in Appendix C.7.

Table 5.10

Impact of Value-Weighted [Cumulative] Industry (Ten FTSE Economic Groups) and Country Factors in Variance of Residuals from ICAPM Model, An EGARCH (1, 1) Model with Leverage Effect, Sub-Samples of Developed and Emerging [Stock] Markets (January 1994 – June 2003)

This table reports the estimated coefficients for each factor, i.e., a world market factor (FTSE), a country factor (CNT) and a value-weighted [cumulative] industry factor (IND), from the EGARCH regression model for each country. Standard errors are reported for each coefficient in square brackets, along with some model specification diagnostics. The mean equation is specified as an ICAPM model: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t}$; and, variance equations are specified as three augmented EGARCH(1,1) processes without leverage effect. They are: Model I: EGARCH(1,1) + LEV + $[\text{Country Factor}]_{k,t}$; Model II: EGARCH(1,1) + LEV + $[\text{Industry Factor}]_{k,t}$; and, Model III: EGARCH(1,1) + LEV $+[\text{Country Factor}]_{k,t}+[\text{Industry Factor}]_{k,t}$, with the assumption that the residuals from the mean equation follow a normal distribution. An EGARCH(1,1) with the leverage effect is used as the reference model and is reported under column "Benchmark: ICAPM + EGARCH + LEV." r_k (r_{FTSE}) is the weekly excess return of country k (a world market portfolio) above a one-week Eurodollar deposit rate; country and value-weighted industry factors are estimated from a dummy variable regression model of Heston and Rouwenhorst (1994) via industry returns on all available FTSE Economic Group indices in two sub-samples of markets. Panel A reports the regression results for a sub-sample of developed markets (11); and, Panel B for a sub-sample of emerging markets (22). Capital-weights are computed by using market capitalization at the beginning of the synthetic week (Wednesday-to-Wednesday) for each available Economic Group index within each market. Both adjusted R^2s and Schwartz Bayesian Information Criterion (BIC) is also provided along with each model to compare the effectiveness of four model specifications. Significance at the 1% level is denoted by ***, at the 5% level by **, and at the 10% level by *.

Panel A: Developed Markets Only

Group	Sub-group	Country	Benchmark: ICAPM + EGARCH +LEV				Model I: Country Factor					Model II: Industry Factor					Model III: Country Factor + Industry Factor					
			FTSE	LEV	Adj. R-sq	BIC	FTSE	LEV	CNT	Adj. R-sq	BIC	FTSE	LEV	IND	Adj. R-sq	BIC	FTSE	LEV	CNT	IND	Adj. R-sq	BIC
DSM	G7	Canada	0.880***	<0.000	0.578	-2661.1	0.881***	<0.000	-1.000	0.578	-2654.7	0.891***	<0.000	-12.239***	0.578	-2660.8	0.891***	<0.000	-1.000	-11.509**	0.577	-2654.7
			[0.032]	[0.128]			[0.032]	[0.171]	[1.394]			[0.032]	[0.147]	[4.997]			[0.032]	[0.192]	[1.451]	[4.942]		
		United States	1.056***	0.884*	0.857	-3214.0	1.057***	1.000	-17.531***	0.854	-3215.3	1.048***	1.000	20.838***	0.856	-3213.5	1.055***	>0.000	-17.003***	32.473***	0.854	-3216.8
			[0.017]	[0.645]			[0.018]	[0.678]	[6.053]			[0.017]	[0.613]	[8.286]			[0.017]	[0.445]	[5.327]	[11.015]		
		France	1.039***	-0.487*	0.602	-2516.8	1.033***	-0.434*	-3.836***	0.601	-2515.7	1.023***	-0.523*	15.416*	0.600	-2512.4	1.021***	<0.000	-3.695***	17.328**	0.599	-2512.0
			[0.032]	[0.316]			[0.033]	[0.308]	[1.126]			[0.032]	[0.318]	[10.331]			[0.032]	[0.326]	[1.131]	[9.839]		
		Germany	1.159***	<0.000	0.633	-2500.5	1.152***	<0.000	-2.578**	0.631	-2496.8	1.155***	<0.000	1.000	0.632	-2494.3	1.151***	<0.000	-2.489*	2.000	0.630	-2490.8
			[0.032]	[0.121]			[0.033]	[0.128]	[1.524]			[0.032]	[0.133]	[4.477]			[0.033]	[0.140]	[1.526]	[4.313]		
		United Kingdom	0.808***	-0.952**	0.611	-2777.1	0.807***	-0.980**	>0.000	0.610	-2771.0	0.808***	-0.969*	-2.000	0.611	-2771.0	0.807***	-0.977*	1.000	-3.000	0.610	-2765.1
			[0.028]	[0.550]			[0.028]	[0.575]	[0.902]			[0.027]	[0.604]	[4.018]			[0.027]	[0.604]	[0.963]	[4.431]		
		Italy	1.034***	0.407*	0.377	-2154.7	1.015***	0.404*	>0.000	0.376	-2147.7	1.009***	0.435**	<0.000	0.376	-2147.6	1.008***	0.328*	1.000	-1.000	0.375	-2142.0
			[0.054]	[0.258]			[0.054]	[0.280]	[0.711]			[0.054]	[0.240]	[2.294]			[0.051]	[0.250]	[0.689]	[2.173]		
		Japan	0.678***	-0.514***	0.250	-2191.5	0.708***	-0.752***	5.234***	0.241	-2200.9	0.648***	-1.000**	-6.350*	0.242	-2194.8	0.698***	-0.857***	4.522***	-17.252**	0.239	-2199.3
			[0.039]	[0.121]			[0.038]	[0.212]	[0.770]			[0.051]	[0.555]	[4.172]			[0.039]	[0.210]	[0.764]	[8.106]		
	Asia/ Australasia	Australia	0.615***	-1.000	0.321	-2471.7	0.615***	-1.000	-1.000	0.319	-2467.7	0.634***	-1.000	-3.000	0.319	-2466.1	0.631***	-1.000	-1.000	-3.000	0.318	-2461.8
			[0.039]	[1.621]			[0.039]	[2.303]	[1.321]			[0.040]	[2.120]	[3.207]			[0.039]	[3.243]	[1.246]	[3.323]		
		New Zealand	0.528***	<0.000	0.150	-2183.6	0.523***	<0.000	-1.000	0.148	-2178.3	0.518***	-1.000	1.000	0.148	-2177.8	0.520***	<0.000	-1.000	1.000	0.146	-2174.0
			[0.043]	[0.372]			[0.039]	[0.593]	[0.784]			[0.040]	[0.680]	[1.130]			[0.039]	[0.620]	[0.788]	[1.177]		
		Hong Kong/China	0.829***	-0.391***	0.257	-2019.3	0.831***	<0.000	-1.464***	0.255	-2019.7	0.836***	-0.380**	1.000	0.256	-2013.2	0.829***	<0.000	-1.608***	-2.000	0.253	-2013.9
			[0.057]	[0.163]			[0.055]	[0.157]	[0.477]			[0.057]	[0.174]	[2.517]			[0.055]	[0.158]	[0.513]	[2.994]		
		Singapore	0.644***	-0.467**	0.164	-1964.9	0.652***	<0.000	-1.095**	0.163	-1961.3	0.648***	-0.367**	-3.891**	0.162	-1961.1	0.654***	<0.000	-1.495***	-5.760***	0.160	-1959.4
			[0.054]	[0.210]			[0.053]	[0.200]	[0.619]			[0.056]	[0.183]	[2.017]			[0.054]	[0.173]	[0.603]	[2.380]		

Panel B: Emerging Markets Only

Group	Sub-group	Country	Benchmark: ICAPM + EGARCH +LEV				Model I: Country Factor					Model II: Industry Factor					Model III: Country Factor + Industry Factor					
			FTSE	LEV	Adj. R-sq	BIC	FTSE	LEV	CNT	Adj. R-sq	BIC	FTSE	LEV	IND	Adj. R-sq	BIC	FTSE	LEV	CNT	IND	Adj. R-sq	BIC
ESM	Advanced	Brazil	1.004***	-0.917***	0.179	-1436.1	1.153***	-0.496***	-1.649***	0.182	-1461.6	1.018***	-0.893***	1.000	0.178	-1430.2	1.150***	-0.510***	-1.634***	-1.000	0.180	-1455.5
			[0.051]	[0.245]			[0.075]	[0.178]	[0.245]			[0.063]	[0.260]	[3.103]			[0.080]	[0.202]	[0.243]	[3.028]		
		Mexico	1.056***	-1.000***	0.235	-1755.3	1.071***	-1.000***	-1.157***	0.233	-1754.3	1.057***	-1.000***	-3.223**	0.233	-1750.7	1.066***	-1.000***	-1.138***	-3.144*	0.232	-1750.2
			[0.063]	[0.333]			[0.063]	[0.344]	[0.367]			[0.062]	[0.362]	[1.817]			[0.065]	[0.389]	[0.417]	[2.367]		
		Israel	0.622***	-0.476*	0.143	-1955.0	0.656***	<0.000	-2.808***	0.138	-1957.9	0.621***	-0.463*	2.000	0.141	-1948.9	0.653***	-0.498*	-2.971***	5.000	0.136	-1952.9
			[0.061]	[0.305]			[0.061]	[0.379]	[0.794]			[0.061]	[0.298]	[3.976]			[0.060]	[0.375]	[0.805]	[4.788]		
		Korea	1.037***	-0.469***	0.166	-1557.3	1.028***	-0.463***	>0.000	0.164	-1550.9	1.032***	-0.446**	-2.606**	0.164	-1554.5	1.035***	-0.463**	>0.000	-2.613**	0.162	-1548.3
			[0.089]	[0.180]			[0.090]	[0.190]	[0.243]			[0.093]	[0.192]	[1.428]			[0.093]	[0.203]	[0.265]	[1.510]		
		Taiwan/China	0.672***	-0.307**	0.117	-1749.9	0.674***	-0.315*	1.000	0.116	-1744.0	0.673***	-0.350*	1.000	0.116	-1744.0	0.683***	-0.555**	<0.000	2.000	0.114	-1737.5
			[0.078]	[0.183]			[0.078]	[0.205]	[0.652]			[0.078]	[0.226]	[1.817]			[0.078]	[0.317]	[0.539]	[1.502]		
		South Africa	0.695***	-0.769***	0.171	-1989.9	0.687***	-0.715**	<0.000	0.169	-1983.9	0.685***	-0.728***	-3.000	0.169	-1984.4	0.685***	-0.736**	<0.000	-3.000	0.168	-1978.3
			[0.059]	[0.284]			[0.060]	[0.307]	[0.762]			[0.058]	[0.280]	[3.557]			[0.059]	[0.330]	[0.778]	[3.689]		
	Asia	India	0.214***	-0.443***	0.011	-1829.1	0.214***	-0.458***	>0.000	0.009	-1822.8	0.230***	-0.641***	5.190*	0.010	-1827.6	0.228***	-0.627***	>0.000	5.969**	0.007	-1820.8
			[0.069]	[0.184]			[0.069]	[0.186]	[0.576]			[0.069]	[0.265]	[3.210]			[0.069]	[0.263]	[0.601]	[3.582]		
		Pakistan	0.187**	-0.170*	-0.010	-1502.4	0.181**	<0.000	-1.000	-0.011	-1497.4	0.188**	-0.175*	-1.000	-0.012	-1496.3	0.181**	<0.000	-1.000	<0.000	-0.013	-1491.2
			[0.103]	[0.114]			[0.102]	[0.140]	[0.503]			[0.105]	[0.116]	[3.183]			[0.103]	[0.147]	[0.545]	[3.370]		
		China	0.259***	<0.000	0.001	-1639.6	0.247***	-0.180**	1.616***	-0.002	-1640.0	0.263***	<0.000	-1.000	-0.001	-1633.4	0.256***	-0.182**	1.631***	<0.000	-0.004	-1633.8
			[0.080]	[0.071]			[0.079]	[0.085]	[0.461]			[0.080]	[0.075]	[3.798]			[0.078]	[0.087]	[0.463]	[3.758]		
		Indonesia	0.294***	-0.245**	0.002	-898.2	0.313***	<0.000	-0.472**	-0.002	-894.9	0.293***	-0.245**	1.000	-0.001	-892.5	0.310***	<0.000	-0.495**	1.000	-0.004	-889.2
			[0.074]	[0.124]			[0.076]	[0.173]	[0.265]			[0.077]	[0.127]	[2.639]			[0.080]	[0.176]	[0.263]	[2.698]		
		Malaysia	0.312***	-0.727***	0.028	-1815.2	0.311***	-0.732***	>0.000	0.026	-1809.0	0.309***	-0.723***	-2.000	0.026	-1809.0	0.308***	-0.750***	0.448*	-3.000	0.024	-1803.1
			[0.061]	[0.148]			[0.061]	[0.153]	[0.305]			[0.061]	[0.156]	[2.510]			[0.061]	[0.168]	[0.316]	[2.699]		
		Philippines	0.438***	-0.332***	0.042	-1179.3	0.440***	-0.299***	<0.000	0.039	-1174.0	0.359***	-0.516***	-12.682***	0.035	-1185.7	0.357***	-0.563***	>0.000	-13.174***	0.032	-1180.1
			[0.078]	[0.116]			[0.079]	[0.127]	[0.392]			[0.070]	[0.142]	[2.801]			[0.069]	[0.177]	[0.393]	[2.859]		
		Thailand	0.637***	-0.456**	0.071	-1277.0	0.634***	-0.376**	<0.000	0.068	-1271.8	0.639***	-0.437**	1.000	0.069	-1271.2	0.632***	-0.337*	<0.000	1.000	0.065	-1266.1
			[0.083]	[0.235]			[0.081]	[0.221]	[0.379]			[0.083]	[0.231]	[2.654]			[0.081]	[0.211]	[0.382]	[2.782]		
	Europe	Czech Republic	0.577***	-1.000	0.095	-1298.0	0.581***	-1.000	>0.000	0.093	-1292.6	0.576***	-1.000	-1.000	0.093	-1292.3	0.579***	-1.000	>0.000	-1.000	0.091	-1286.8
			[0.081]	[3.667]			[0.081]	[3.399]	[1.219]			[0.081]	[3.786]	[3.536]			[0.081]	[3.664]	[1.214]	[3.590]		
		Hungary	0.782***	-1.000	0.216	-1067.5	0.781***	-1.000	<0.000	0.213	-1061.8	0.787***	-1.000	-9.615*	0.213	-1061.4	0.791***	-1.000	<0.000	-9.497*	0.211	-1055.6
			[0.075]	[0.805]			[0.075]	[0.860]	[0.754]			[0.076]	[1.753]	[7.108]			[0.078]	[1.836]	[0.805]	[7.206]		
		Poland	0.762***	-0.444***	0.101	-1631.5	0.771***	-0.515***	>0.000	0.099	-1625.8	0.751***	-0.448**	-5.977***	0.099	-1635.1	0.765***	-0.602**	0.481*	-5.310***	0.097	-1628.4
			[0.073]	[0.171]			[0.073]	[0.196]	[0.381]			[0.070]	[0.271]	[1.610]			[0.071]	[0.324]	[0.369]	[1.504]		
		Turkey	0.849***	>0.000	0.053	-1080.3	0.802***	0.536**	-1.594***	0.040	-1085.4	0.840***	>0.000	2.000	0.051	-1075.0	0.807***	0.535**	-1.557***	2.000	0.039	-1079.5
			[0.136]	[0.143]			[0.141]	[0.281]	[0.353]			[0.138]	[0.146]	[2.706]			[0.140]	[0.282]	[0.352]	[3.475]		
		Russia	0.827***	-1.000	0.079	-701.4	0.799***	-1.000	-1.028***	0.071	-700.9	0.783***	-1.000	-2.451**	0.074	-693.5	0.737***	-1.000	-0.949***	-3.409***	0.065	-700.8
			[0.117]	[0.949]			[0.098]	[1.000]	[0.273]			[0.099]	[1.093]	[1.248]			[0.089]	[1.227]	[0.380]	[1.038]		
	Lat. America	Argentina	0.906***	-0.229***	0.103	-1558.6	0.930***	<0.000	-1.686***	0.099	-1558.2	0.894***	-0.220***	-1.000	0.102	-1552.5	0.926***	<0.000	-1.798***	-2.000	0.097	-1552.4
			[0.081]	[0.084]			[0.079]	[0.100]	[0.508]			[0.081]	[0.085]	[2.923]			[0.080]	[0.103]	[0.521]	[2.751]		
		Chile	0.503***	-0.310***	0.123	-2025.2	0.516***	-0.243**	1.106**	0.122	-2023.2	0.509***	-0.311***	>0.000	0.122	-2019.1	0.517***	-0.259***	1.206**	-1.000	0.121	-2017.1
			[0.055]	[0.117]			[0.052]	[0.105]	[0.636]			[0.055]	[0.123]	[1.728]			[0.052]	[0.110]	[0.687]	[1.805]		
		Colombia	0.161**	-0.190**	0.002	-1767.3	0.195**	-1.000***	1.040***	0.000	-1761.2	0.166**	-1.000***	-4.147***	0.000	-1760.7	0.159**	-1.000***	0.865***	-3.321**	-0.003	-1758.0
			[0.076]	[0.098]			[0.088]	[0.363]	[0.359]			[0.081]	[0.318]	[1.693]			[0.084]	[0.392]	[0.364]	[1.626]		
		Peru	0.173***	-0.436**	0.014	-1805.8	0.174***	-0.410**	<0.000	0.012	-1799.7	0.165**	-0.409**	-2.628*	0.011	-1800.7	0.163**	-0.399**	>0.000	-3.000	0.009	-1794.3
			[0.072]	[0.195]			[0.072]	[0.216]	[0.660]			[0.073]	[0.186]	[2.003]			[0.073]	[0.197]	[0.706]	[2.290]		

Panel B suggests that most of 22 emerging markets are less sensitive to the industry factor estimated strictly from this group of countries; the number of countries with significant coefficients also declines relative to Table 5.9. This empirical evidence may suggest that industry factors computed strictly from emerging markets are less representative of innovations in their corresponding industries than those computed from a sample including both developed and emerging markets.

As a summary, regression-based analysis in this section suggests that the country factor plays an important role in most emerging markets and in some developed markets. On the other side, the industry factor only contributes marginally to the increase of the explanatory power of the model when compared to the ICAPM model for average market returns and an EGARCH model with the mean equation specified as the ICAPM for market volatilities.

5.3 Time Varying Analysis

The mixed results in previous sections suggest that the importance of industry and country factors in each market may be changing over time. This section presents industry and country factors in a time-varying framework. Instead of examining the evolutionary role of each factor on a market-by-market basis, following the existing studies, individual industry (country) factor is aggregated cross-sectionally into its collective form via equally- or capital- weighting schemes (e.g., Cavaglia, Brightman and Aked (2000); Baca, Garbe and Weiss (2000)). That is, in each week, individual industry (country) factor, measured in their absolute values, is first either averaged or value-weighted[73] across industries (markets) to obtain the time-series data. Then, for each time series, means and standard deviations are computed within a rolling window of 36 weeks.[74] Given the possible existence of outlier observations within each rolling window that may distort means and standard deviations, two robust measures of

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[73] The value-weighted aggregate industry (country) factor has the expedient explanation as the opportunity costs for portfolio managers who mimic the industry (country) composition of the benchmark world market portfolio without tilting towards global industry (country) factor (Rouwenhorst (1999); Cavaglia, Brightman and Aked (2000)).

[74] This section presents time-series plots of each statistic within a rolling window of 36 weeks. To save space, the times-series plots in a rolling window of 52 weeks are not presented in this study and they are available upon request. Major conclusions made based upon 36-week analysis also apply to the 52-week case.

location and dispersion are also computed, i.e., medians and median absolute deviations (MADs, with centre measured as medians of a given data series) within the same rolling window. A shorter window is preferred in this study for the reason that it may better capture the dynamics of the industry factor than a long window because the industry factor is short-lived than the country factor and hence a long window tends to over-smooth industry factor.

For each computed statistic under two weighting schemes, time-series plots are employed to examine the relative strength of each factor in a dynamic framework. Both the plots for each factor estimated from all 33 markets and the plots for each factor estimated from two sub-samples of 11 developed and 22 emerging markets are provided. Through these plots, a comparison can be made among three investment strategies with the first focusing on developed markets only, the second on emerging markets only, and the last on a mix of both types of markets during 1994-2003.

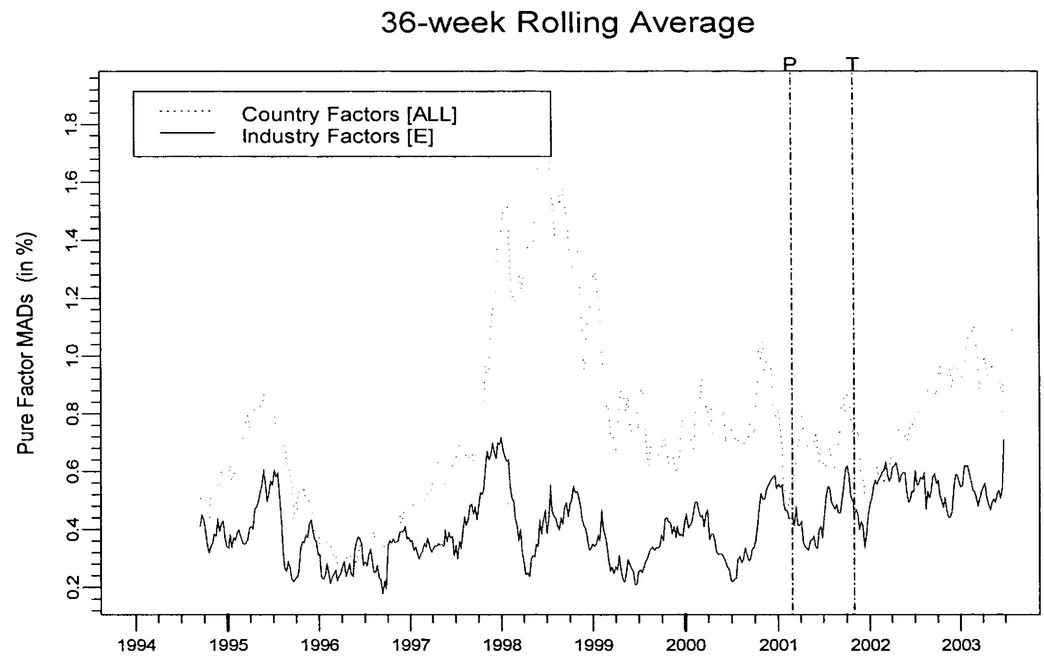
Furthermore, the global business cycles, proxied by U.S. business cycles as marked by National Bureau of Economic Research (NBER), are also provided in each plot. The U.S. business cycles are used to represent global business cycles for two reasons. First, no consensus has been reached yet in existing literature on the methodology to date global business cycles. Second, given the importance of the U.S. in world economy and its leadership in most industries, it is natural to use U.S. business cycles to represent the global business cycles.[75] Empirical studies also show that innovations are usually transmitted from the U.S. to other markets; however the feedback effects are much smaller (e.g., Eun and Shim (1989)). With the business cycles, the performance of industry and country factors in different phases of global business cycles can be examined. It is expected that the industry factor may be strengthened relative to country factor during the recovery/expansion period and may be weakened relative to the country factor during the recession/extraction period.

[75] Heathcote and Perri (2002) have shown that during the period 1986-2000, U.S. business cycles are less corroborated with the business cycles in other industrialized countries than they are during the period of 1972-1986. Hence the arbitrary selection of U.S. business cycles as the proxy for the international business cycles may introduce biases in the conclusions regarding the relative importance of industry and country factor during each stage of the business cycle.

5.3.1 Equally-Weighted Aggregate Industry and Country Factors

Figures 5.1 and 5.2 have provided the time-series plots for the computed statistics for the aggregate industry and country factors estimated from industry returns on ten FTSE Economic Groups available in all 33 markets.

Figure 5.1 plots the 36-week rolling averages and standard deviations (proxy for volatility) of each factor during 1994-2003. From the rolling average measure, the time series plots exhibit that during the sample period, average country factor dominates average industry factor. This phenomenon is much more pronounced during the period of 1997-1998. Not surprisingly, during this period, most of Asian countries were heavily stricken by the notorious Asian Financial Crisis. Apart from that, during most of the sample period, the industry factor fluctuates in tandem with the country factor. This pattern seems broken during 1996 and 2002, in which the industry factor has gained its importance relative to and even has dominated country factor. In recent years, especially after mid-2002, however, the country factor has resumed its dominance over industry factor. One of the interesting features of this plot is that the industry factor seems to show an uptrend. Meanwhile, the country factor has less clear pattern: It declined in its magnitude during early sample period of 1995-1996; after that, the country factor has increased significantly relative to industry factor, which can be visually judged from the widening vertical gap between two factors. The gap does not decrease to the pre-crisis level after 1999.



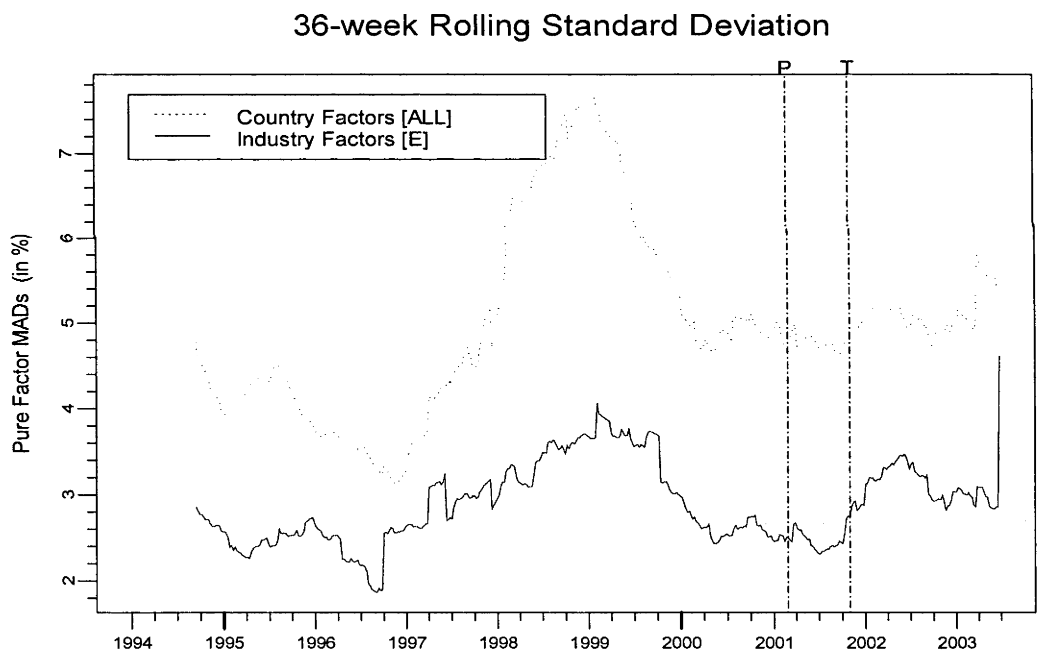
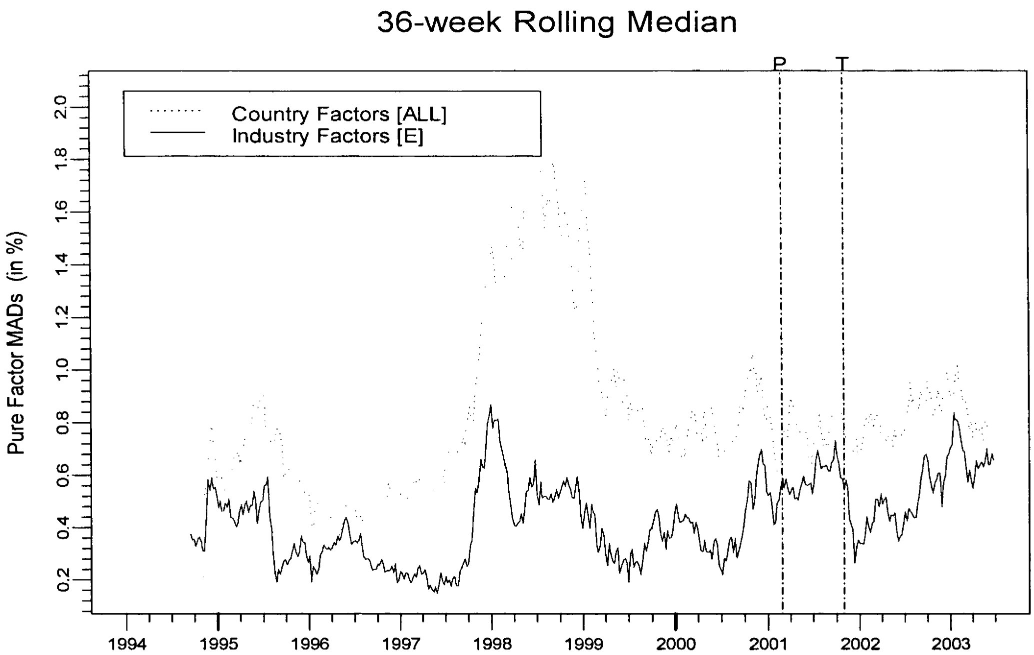


Figure 5.1. 36-week rolling averages and standard deviations of equally-weighted aggregate industry (ten FTSE Economic Groups) and country factors (all 33 markets) during the period 1994 – 2003.

In these plots, industry (country) factors are aggregated as the cross-sectional averages of absolute values of estimated factor loadings for all 10 FTSE Economic Groups (all 33 markets). Within each rolling window, means and standard deviations are computed for each aggregate factor. "P" and "T" denote the U.S. business cycle peak and trough dates as identified by National Bureau of Economic Research during 1994 - 2004.



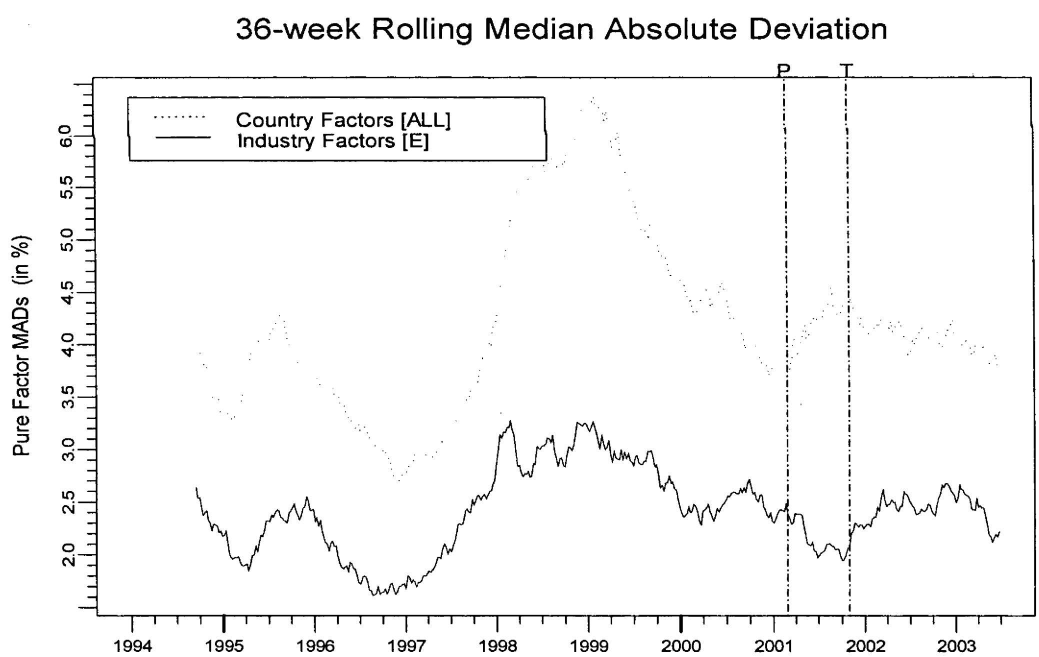


Figure 5.2. 36-week rolling medians and MADs of equally-weighted aggregate industry (ten FTSE Economic Groups) and country factors (all 33 markets) during the period 1994 – 2003.

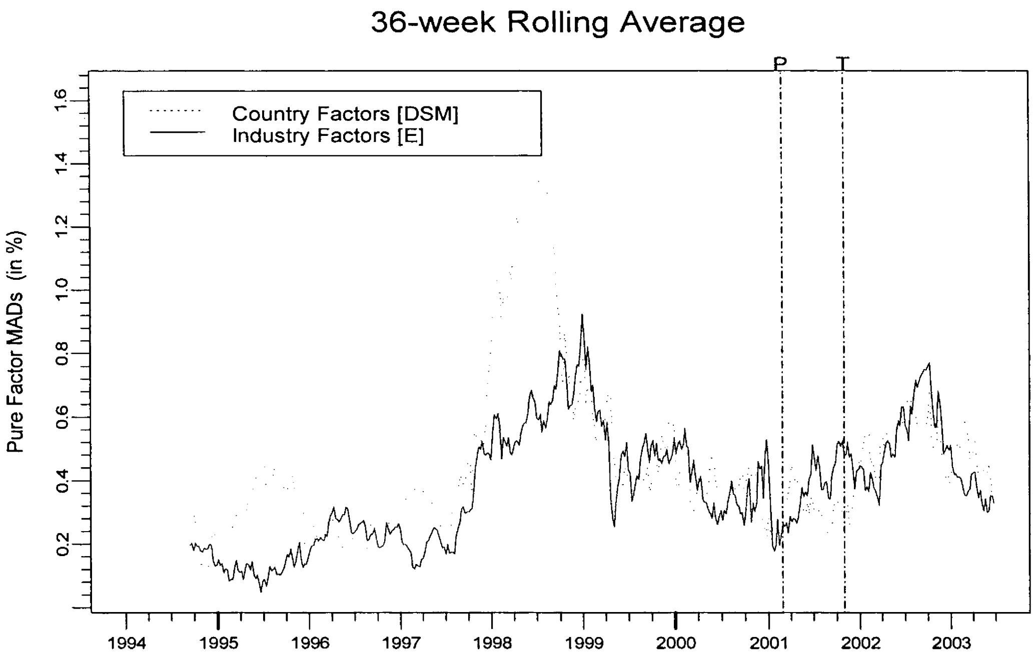
In these plots, industry (country) factors are aggregated as the cross-sectional averages of absolute values of estimated factor loadings for all 10 FTSE Economic Groups (all 33 markets). Within each rolling window, medians and median absolute deviations are computed for each aggregate factor. "P" and "T" denote the U.S. business cycle peak and trough dates as identified by National Bureau of Economic Research during 1994 - 2004.

Both panels in Figure 5.1 exhibit a significant spike for the industry factor around mid-2003. The presence of this spike may reflect the possible existence of outliers, to which both mean and standard deviation are quite sensitive.

As a complement, Figure 5.2 has provided the time series plots for two robust measures of location and dispersion of each factor, i.e., medians and MADs. From the plots in Figure 5.2, the spike for the industry factor has disappeared totally, which confirms the concern about outlier observations. From the top panel of Figure 5.2, it shows that the medians of the industry factor have increased relative to its means, while the medians of the country factor are almost identical to its means plotted in top panel of Figure 5.1. Unlike Figure 5.1, the vertical gap between two factors during recent years has diminished rather than widened. The uptrend of the industry factor in this plot is more obvious, especially during the later half of the sample period. On the other hand, the MADs of both industry and country factors have declined relative to standard deviation in Figure 5.1. During later half sample period, however, both factors have exhibited declining MADs.

Furthermore, there is a significant drop in means (medians) of and a modest increase in standard deviations (MADs) of the industry factor around the trough date. This may imply that the bad performance of industries are affected by, or a harbinger of, the poor business environment.

In an attempt to provide a savvy grasp of each factor in developed and emerging markets, Figure 5.3 through Figure 5.6 have provided analogous plots as those in Figure 5.1 and Figure 5.2, with each factor estimated from a sub-sample of all 11 developed markets (Figure 5.3 and Figure 5.4) and a sub-sample of all 22 emerging markets (Figure 5.5 and Figure 5.6).



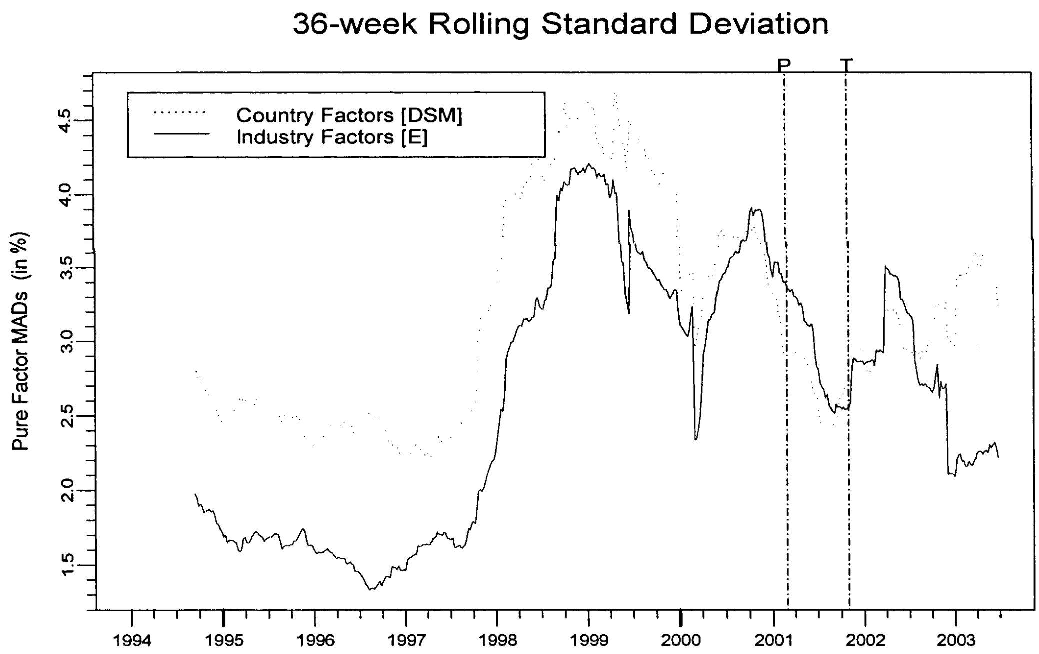
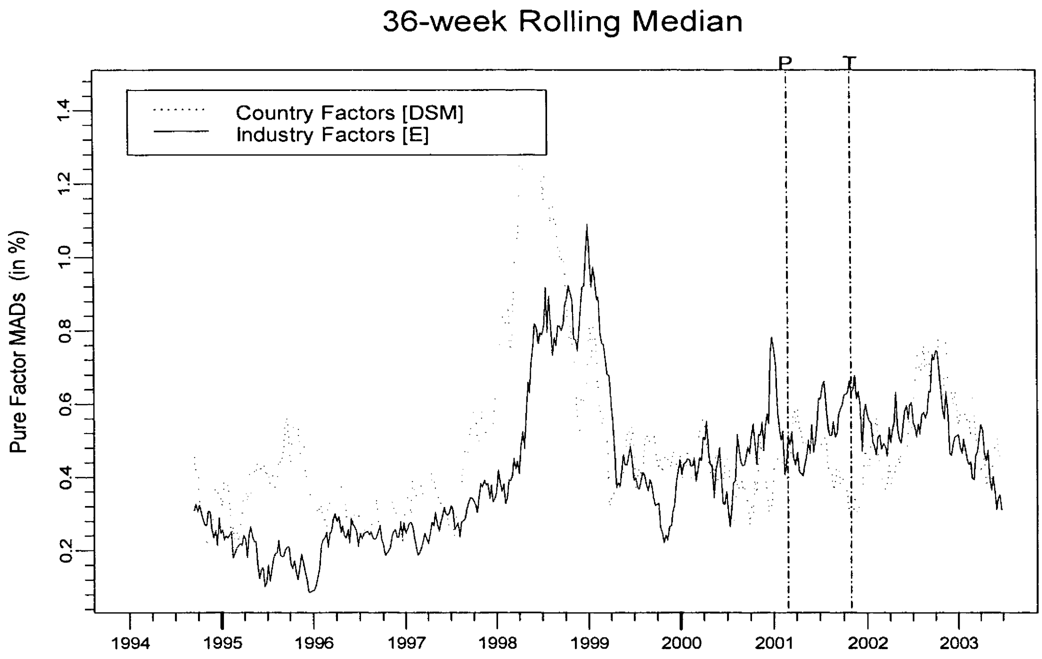


Figure 5.3. 36-week rolling averages and standard deviations of equally-weighted aggregate industry (ten FTSE Economic Groups) and country factors (all 11 developed markets) during the period 1994 – 2003.

In these plots, industry (country) factors are aggregated as the cross-sectional averages of absolute values of estimated factor loadings for all 10 FTSE Economic Groups (all 11 developed markets). Within each rolling window, means and standard deviations are computed for each aggregate factor. "P" and "T" denote the U.S. business cycle peak and trough dates as identified by National Bureau of Economic Research during 1994 - 2004.



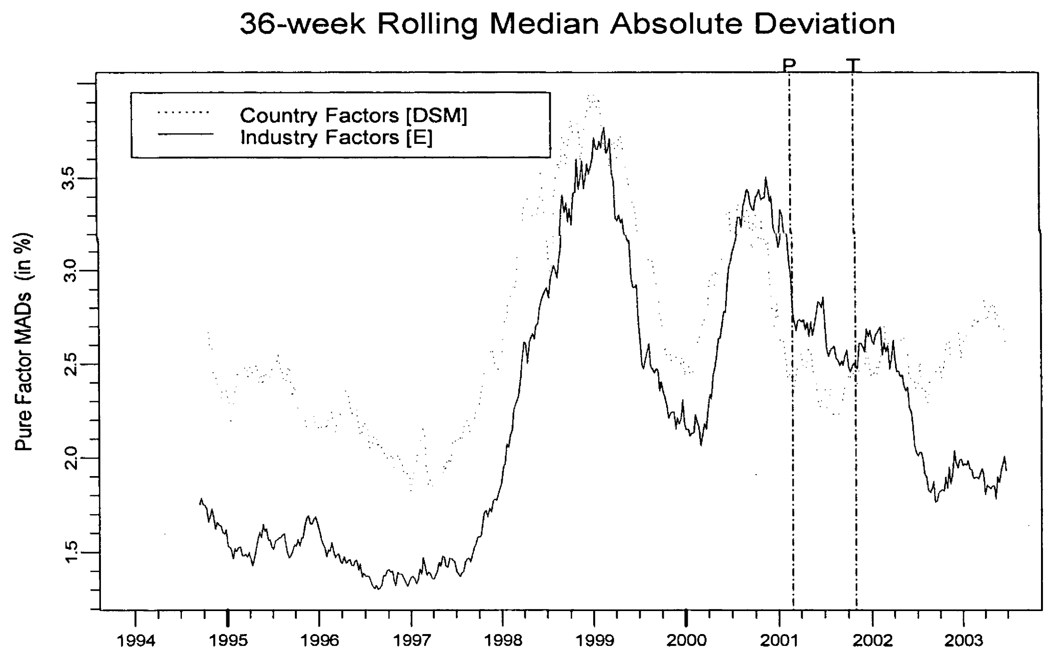
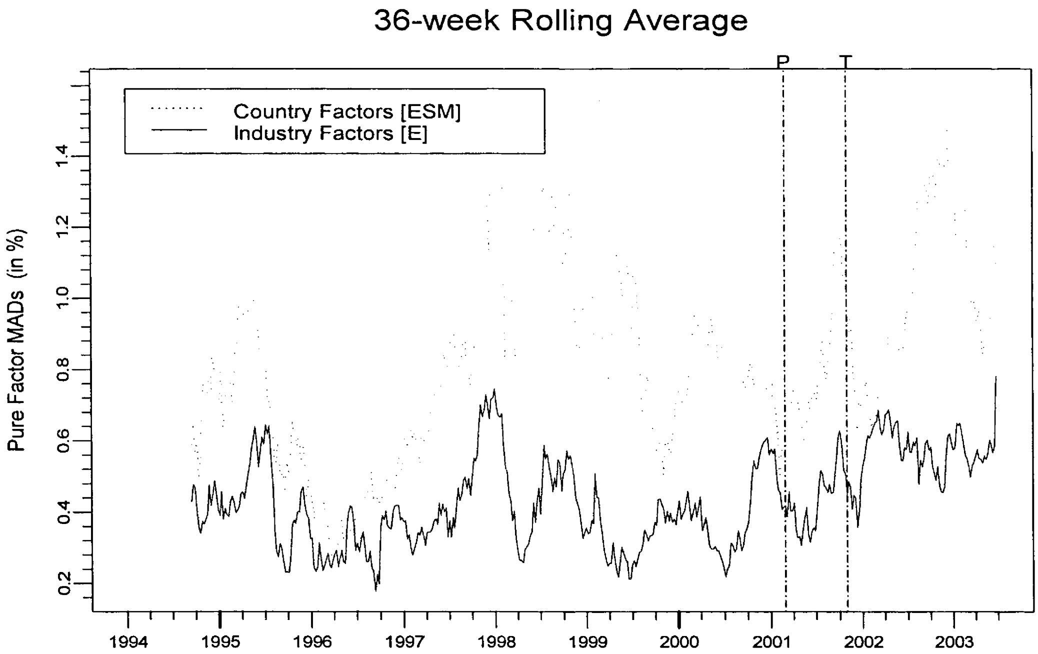


Figure 5.4. 36-week rolling medians and MADs of equally-weighted aggregate industry (ten FTSE Economic Groups) and country factors (all 11 developed markets) during the period 1994 – 2003. In these plots, industry (country) factors are aggregated as the cross-sectional averages of absolute values of estimated factor loadings for all 10 FTSE Economic Groups (all 11 developed markets). Within each rolling window, medians and median absolute deviations are computed for each aggregate factor. "P" and "T" denote the U.S. business cycle peak and trough dates as identified by National Bureau of Economic Research during 1994 - 2004.

Top panel of Figure 5.3 has revealed a different picture from that of Figure 5.1 when a group of 11 developed markets are considered. The industry factor closely trails country factor, especially during the late half of the sample period. The only exception is the period of 1997-1998, during which the country factor has experienced a significant increase in its magnitude relative to industry factor. This sudden increase in the magnitude of the country factor is not a surprise because it is estimated from a sub-sample of 11 developed markets, which includes four countries from Asian/Australasian region. Two of them, i.e., Hong Kong/China and Singapore, were heavily stricken by the Asian crisis of 1997-1998. Meanwhile, an increase in the country factor has also been shown during 9/11 terrorist attack of 2000, but its magnitude is smaller than the case during 1997-1998. The plot of standard deviations of each factor, as presented in the bottom panel of Figure 5.3, has demonstrated that industry volatility is almost identical to country volatility. During the period of 2000-2002, industry volatility even becomes higher that country volatility. However, during recent period, especially after mid-2002, the country factor has become more volatile than the industry factor again. The plots of two robust measures in Figure 5.4 have also confirmed the analysis in Figure 5.3. The uptrend in the industry factor is more pronounced during early half of the sample period, although this trend is resumed in the late half period.

Examined in association with business cycles, Figure 5.3 and Figure 5.4 also indicate that during the expansion period, the industry factor overshoots country factor, such as the period during 1999 to early 2000. During the early contraction period, the industry factor is less important relative to country factor; however, this trend is reversed before the trough date is met. This may imply that the increase in the significance of global industry factors within developed markets signals the recovery of the world economy.



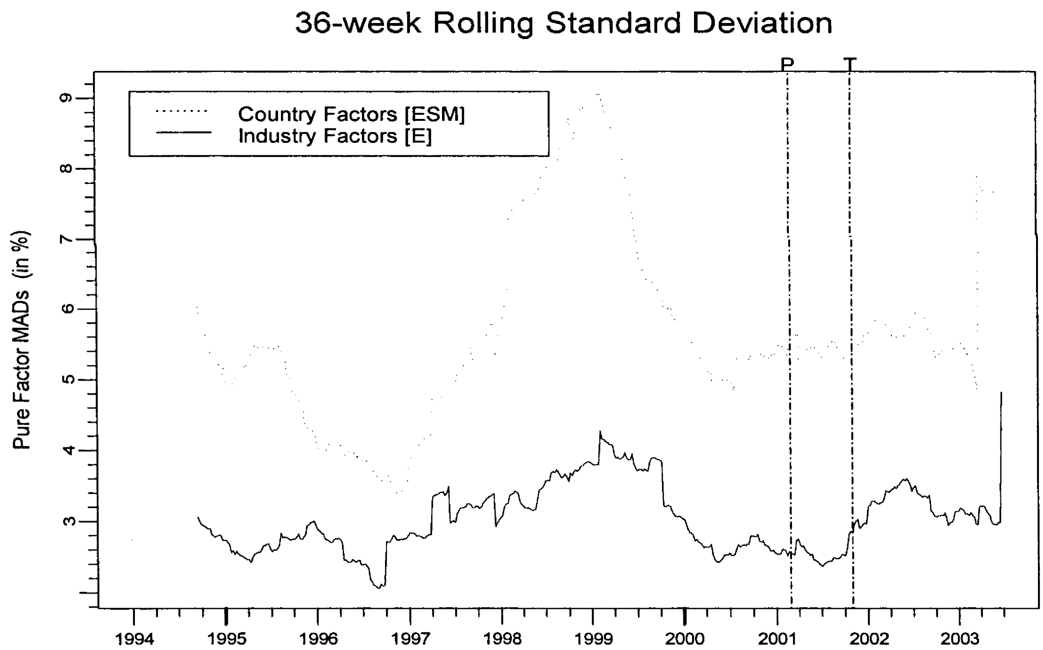
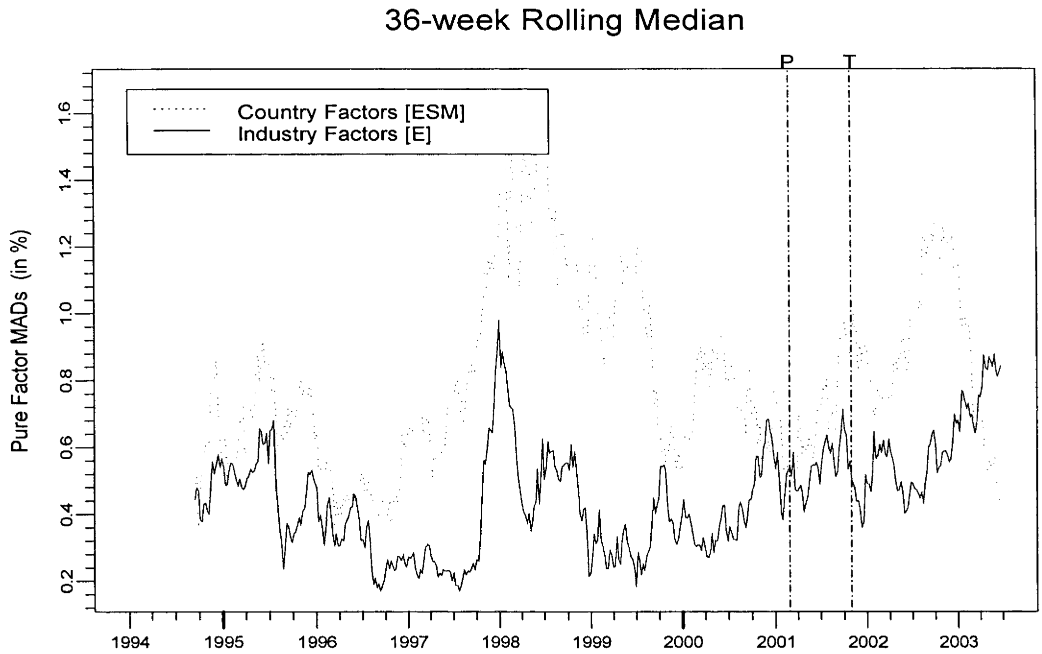


Figure 5.5. 36-week rolling averages and standard deviations of equally-weighted aggregate industry (ten FTSE Economic Groups) and country factors (all 22 emerging markets) during the period 1994 – 2003.

In these plots, industry (country) factors are aggregated as the cross-sectional averages of absolute values of estimated factor loadings for all 10 FTSE Economic Groups (all 22 emerging markets). Within each rolling window, means and standard deviations are computed for each aggregate factor. "P" and "T" denote the U.S. business cycle peak and trough dates as identified by National Bureau of Economic Research during 1994 - 2004.



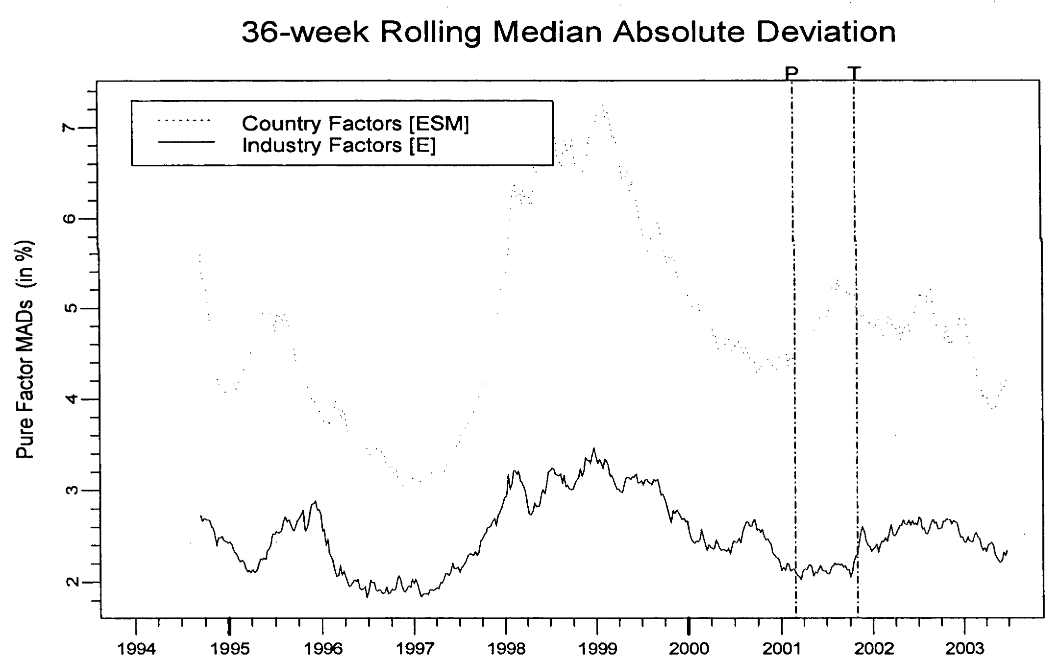


Figure 5.6. 36-week rolling medians and MADs of equally-weighted aggregate industry (ten FTSE Economic Groups) and country factors (all 22 emerging markets) during the period 1994 – 2003. In these plots, industry (country) factors are aggregated as the cross-sectional averages of absolute values of estimated factor loadings for all 10 FTSE Economic Groups (all 22 emerging markets). Within each rolling window, medians and median absolute deviations are computed for each aggregate factor. "P" and "T" denote the U.S. business cycle peak and trough dates as identified by National Bureau of Economic Research during 1994 - 2003.

The plots in Figure 5.5 and Figure 5.6 for all 22 emerging markets stand in direct contrast to the plots of developed markets. Both plots indicate that the country factor has overshadowed the industry factor during the full sample period. The only exception is during the period of 1995-1996 and the year of 2001, in which the difference between industry factor, measured in terms of means and medians, and the country factor is not very big as in other periods and the industry factor even dominates country factor. Two volatility measures, i.e., standard deviations and MADs, also indicate that during those two periods, country volatility has declined when compared with the volatility existing in other periods. There is no obvious pattern between two factors and different phases of business cycles.

Are these results sensitive to the different granularity of industry classification? Figure C.1 through Figure C.6 in Appendix C have provided the analogous time-series plots but with industry and country factors estimated from industry returns of the refined 39 FTSE Industry Sectors. As expected, the industry factor has strengthened in its magnitude relative to the case under a broad industry classification system. Top panels of Figure C.1 and Figure C.2 have shown that measured as mean or medians, during some periods like the period from mid-1999 to mid-2000, the industry factor overshoots country factor, when all 33 markets are considered. The vertical gaps between the volatilities of two factors, as in bottom panels of Figure C.1 and Figure C.2, have reduced significantly relative to those in Figure 5.1 and Figure 5.2.

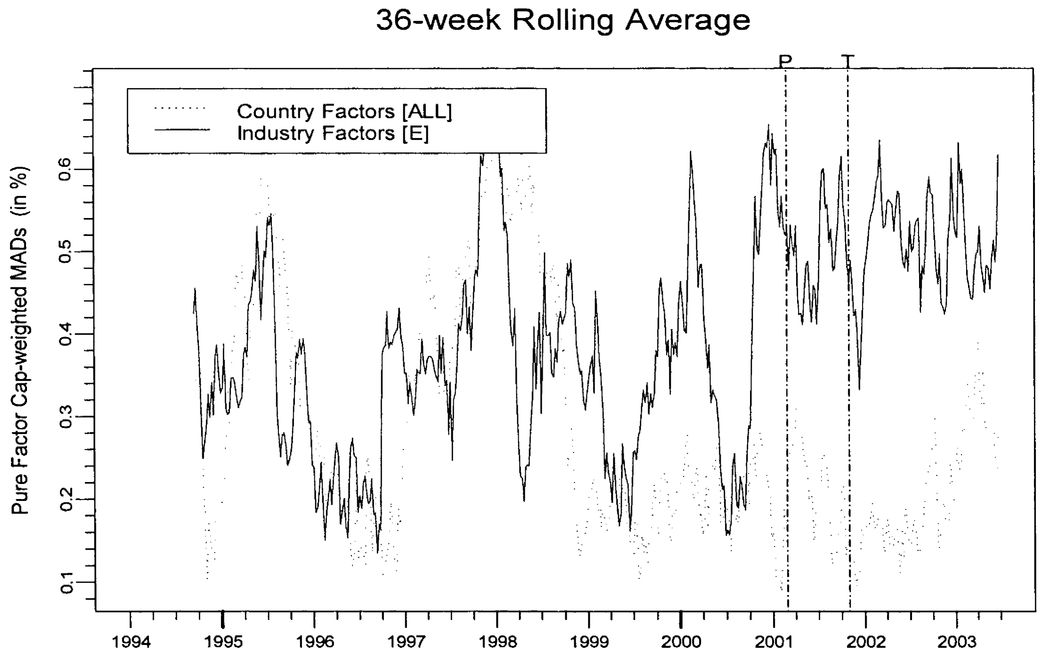
For the industry factor estimated from 11 developed markets, Figure C3 and Figure C.4 demonstrate that the industry factor dominates the country factor both in the average (median) premia and in two volatility measures. The country factor does increase in its magnitude and volatility after the 9/11 terrorist attack, and even dominates the industry factor during recent period, consistent with the results portrayed in Figure 5.3 and Figure 5.4. During the expansion periods, the industry factor plays more important role in the developed markets than it does during the contraction period, measured either in terms of average (median) premia or in terms of its volatility. On the other hand, the time-series plots for the sub-sample of 22 emerging markets in Figure C.5 and Figure C.6 appear to be identical to those plotted in Figure 5.5 and Figure 5.6: The country factor dominates the industry factor during most of sample period, so does the volatility of country factor. Global business cycle seems less important for those industries located in emerging markets than in developed markets.

In summary, under equally-weighting scheme, the analysis in this section has shown that the industry factor plays an important role in developed markets and its significance may be related to the phases of global business cycles, represented by the U.S. business cycles of NBER. For emerging markets, the country factor plays dominant role during the most period of 1994-2003; in some cases, especially during the expansion phase of the business cycle, the industry factor may overshoot the country factor in emerging markets too. Furthermore, financial crises and some unexpected events, such as 9/11 Terrorists Attack of 2001, also increase the significance of the country factor relative to industry factor. A sample with both developed and emerging markets mixed together, may overestimate country factor. This evidence implies that for an international portfolio with emerging markets included, country factors should be considered together with world market portfolio. The empirical results are also robust to a finely portioned version of industry classification.

5.3.2 Value-Weighted Aggregate Industry and Country Factors

Figure 5.7 shows the time-series plots of means and standard deviations of value-weighted industry and country factors estimated from all 33 markets.

Rolling average plot of each factor in top panel of Figure 5.7 stands a marked contrast with the top panel of Figure 5.1 under equally-weighting scheme. The industry factor trails the country factor in the early half of the sample period. During the later half sample period, especially after mid-1999, however, the industry factor has dominated the country factor and has exhibited an uptrend in its magnitude. There is a decline in the magnitude of the industry factor during 9/11 terrorists attack of 2000. The magnitude of the industry factor and its time-series patter are almost identical to Figure 5.1. On the other hand, the country factor has declined in its magnitude relative to Figure 5.1, though there is a steady uptrend during recent years.



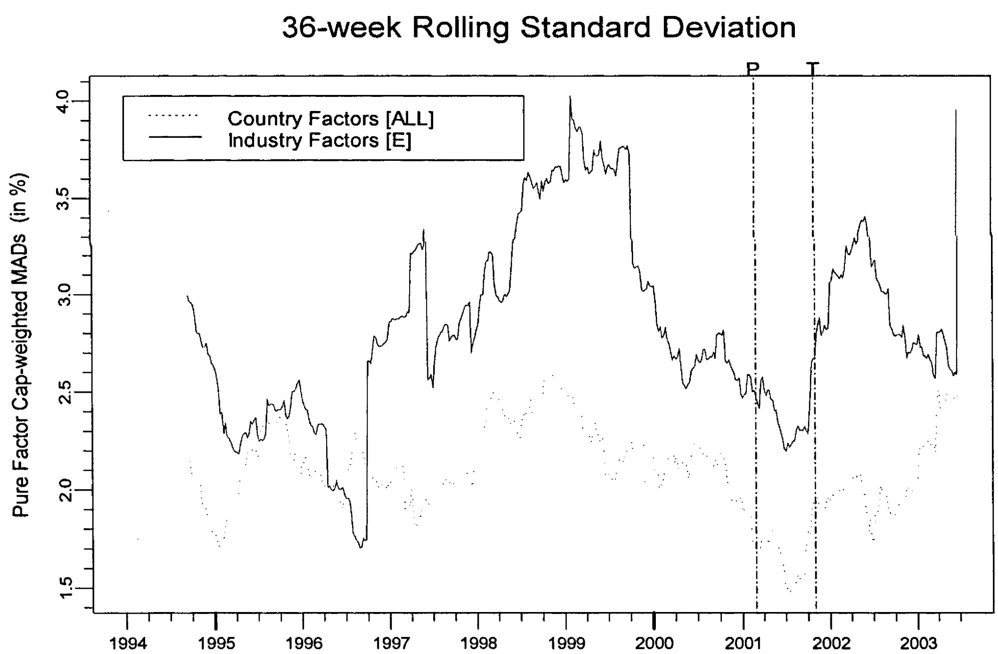
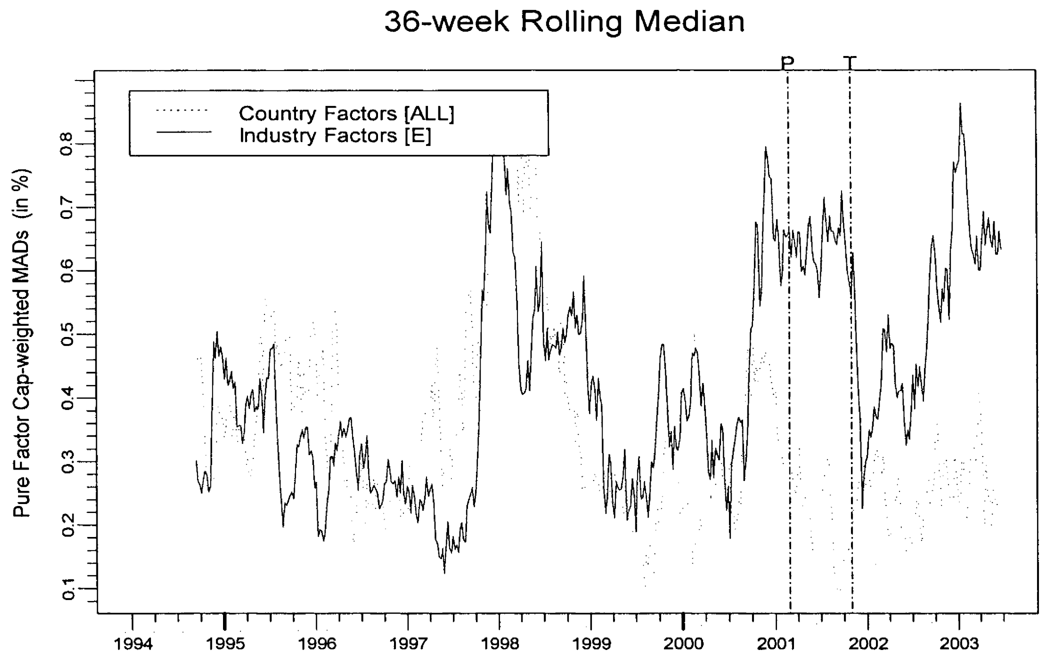


Figure 5.7. 36-week rolling averages and standard deviations of value-weighted aggregate industry (ten FTSE Economic Groups) and country factors (all 33 markets) during the period 1994 – 2003. In these plots, industry (country) factors are aggregated as the cross-sectional value-weighted absolute values of estimated factor loadings for all 10 FTSE Economic Groups (all 33 markets). Capital-weights are computed using market capitalization at the beginning of a synthetic week (Wednesday-to-Wednesday) for the corresponding industries (markets). Within each rolling window, means and standard deviations are computed for each aggregate factor. "P" and "T" denote the peak and trough dates of the U.S. business cycles as identified by National Bureau of Economic Research during 1994 - 2004.



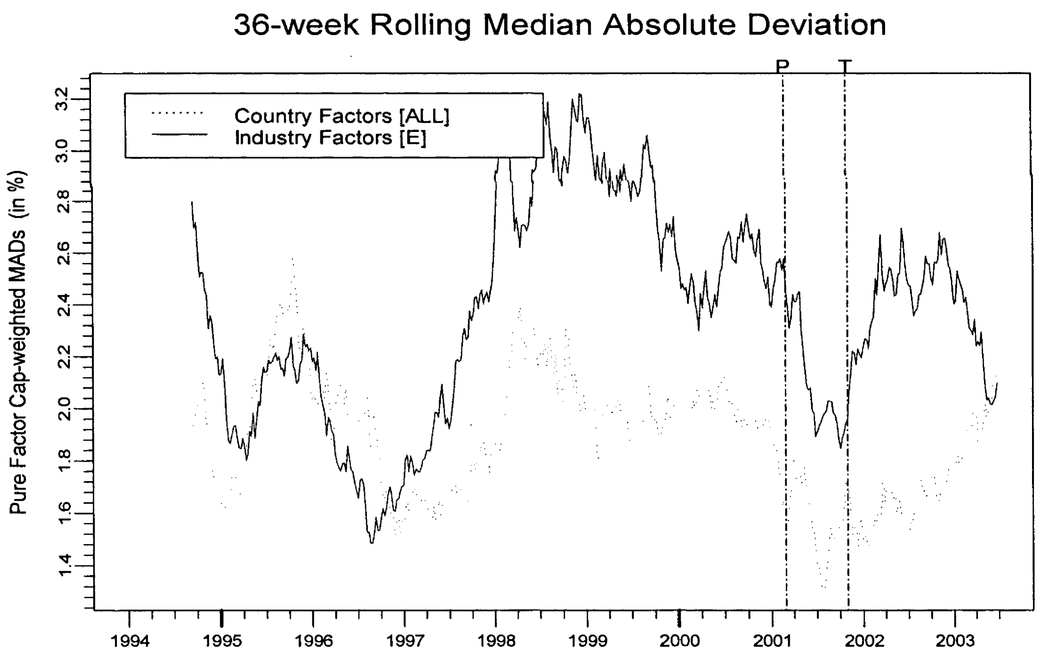


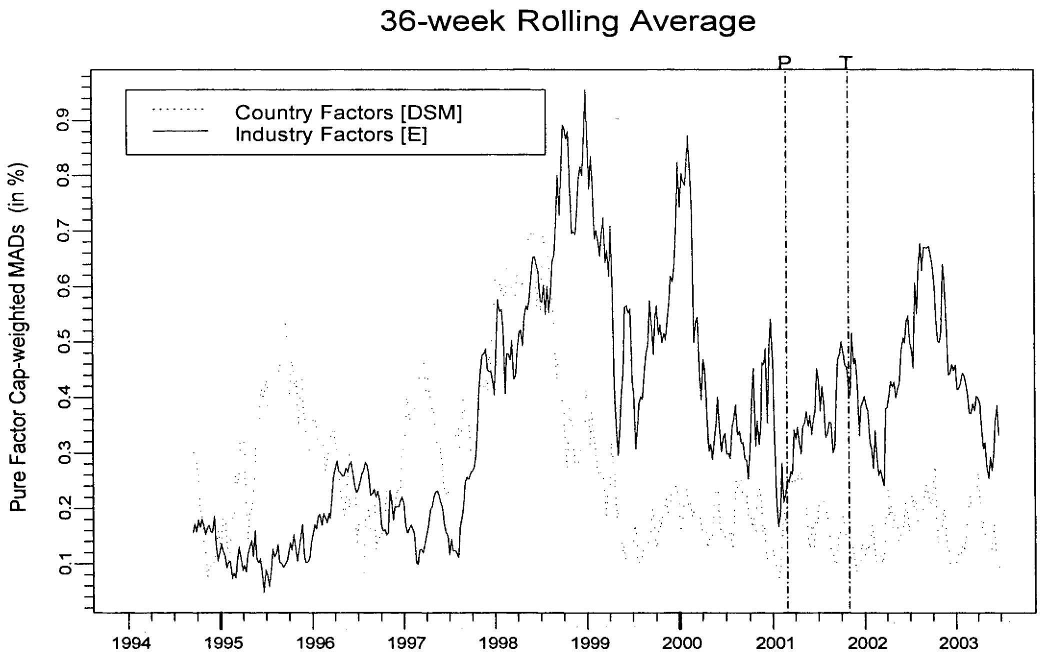
Figure 5.8. 36-week rolling medians and MADs of value-weighted aggregate industry (ten FTSE Economic Groups) and country factors (all 33 markets) during the period 1994 – 2003.

In these plots, industry (country) factors are aggregated as the cross-sectional value-weighted absolute values of estimated factor loadings for all 10 FTSE Economic Groups (all 33 markets). Capital-weights are computed using market capitalization at the beginning of a synthetic week (Wednesday-to-Wednesday) for the corresponding industries (markets). Within each rolling window, medians and median absolute deviations are computed for each aggregate factor. "P" and "T" denote the peak and trough dates of the U.S. business cycles as identified by National Bureau of Economic Research during 1994 - 2004.

The bottom panel of Figure 5.7 shows that the volatility of the industry factor (measured in standard deviations) also dominates the country factor during most of the sample period. The differences, measured as the vertical gap, between two factors are much larger during 1998-1999, in which worldwide IT firms witnessed spectacular performance. The year of 2003, however, has witnessed an increasing volatility of country factor, so is the difference between two factors. In Figure 5.8, two robust measures, i.e., means and MADs, largely corroborate the results in Figure 5.7.

Figure 5.9 and Figure 5.10 have provided the time-series plots for industry and country factors estimated from 11 developed markets. In the top panels of both figures, the industry factor dominates country factor, especially during the later half of the sample period. There appears an obvious uptrend for industry factor, especially during the first expansion period of NBER business cycles. In the second expansion period, this trend is less prominent for the industry factor and it has even exhibited a sudden decline in its magnitude during recent years. On the other hand, during the crisis period of 1998-1999, both industry and country factors have exhibited a significant increase in their mean (median) returns and standard deviations (MADs).

This is reflective of the fact that two of developed markets, i.e., Hong Kong/China and Singapore, were heavily hit by the Asian Financial Crisis of 1997-1998. In comparison with Figures 5.3 and 5.4, it reveals that the magnitudes of industry and country factors in Figures 5.8 and 5.9 are not as big as those in Figures 5.3 and 5.4, especially for the country factor. This evidence is consistent with the fact that those two crisis-stricken countries are relatively small in their market capitalizations, so does the impact of their country factors in the portfolio. This evidence also implies that a value-weighted international portfolio may reduce its exposures to country-specific factors, consistent with the portfolio theory of Markowitz (1952).



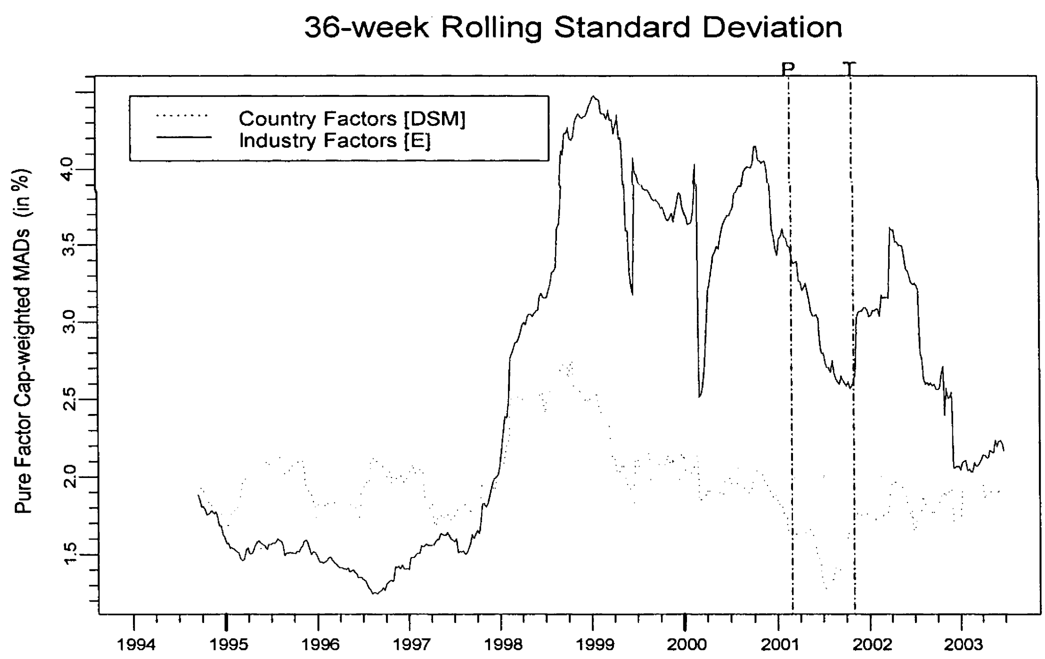


Figure 5.9. 36-week rolling averages and standard deviations of value-weighted aggregate industry (ten FTSE Economic Groups) and country factors (all 11 developed markets) during the period 1994 – 2003.

In these plots, industry (country) factors are aggregated as the cross-sectional value-weighted absolute values of estimated factor loadings for all 10 FTSE Economic Groups (all 11 developed markets). Capital-weights are computed using market capitalization at the beginning of a synthetic week (Wednesday-to-Wednesday) for the corresponding industries (markets). Within each rolling window, means and standard deviations are computed for each aggregate factor. "P" and "T" denote the peak and trough dates of the U.S. business cycles as identified by National Bureau of Economic Research during 1994 - 2004.

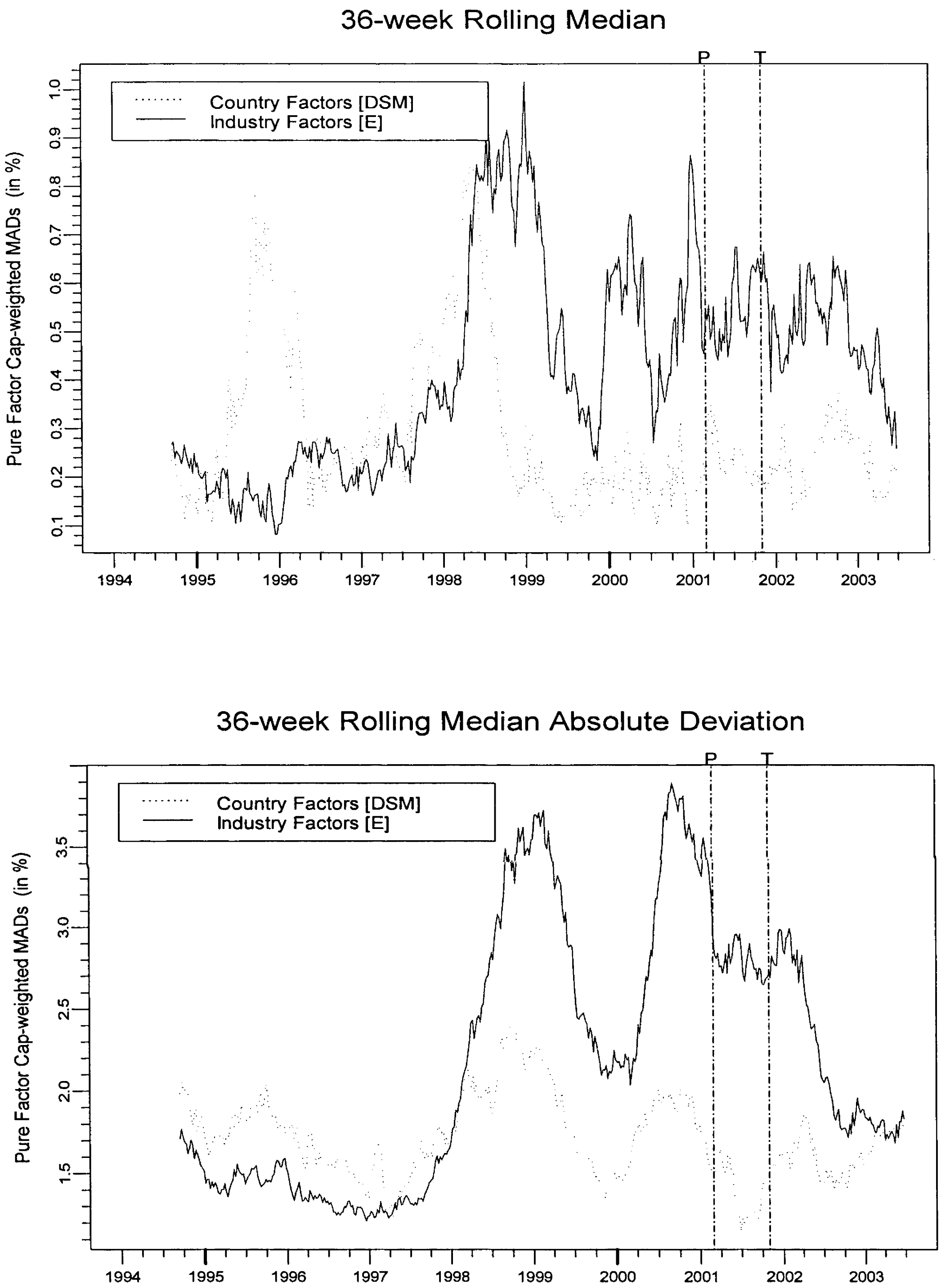


Figure 5.10. 36-week rolling medians and MADs of value-weighted aggregate industry (ten FTSE Economic Groups) and country factors (all 11 developed markets) during the period 1994 – 2003. In these plots, industry (country) factors are aggregated as the cross-sectional value-weighted absolute values of estimated factor loadings for all 10 FTSE Economic Groups (all 11 developed markets). Capital-weights are computed using market capitalization at the beginning of a synthetic week (Wednesday-to-Wednesday) for the corresponding industries (markets). Within each rolling window, medians and median absolute deviations are computed for each aggregate factor. “P” and “T” denote the peak and trough dates of the U.S. business cycles as identified by National Bureau of Economic Research during 1994 – 2004.

Figures 5.11 and 5.12 have provided a similar plot as before but with a focus on 22 emerging markets. As can be seen from those two figures, during the sample period, the country factor dominates industry factor. During the crisis period of 1998-1999, both figures show a significant increase in the importance of the country factor in both rolling means (medians) and rolling standard deviations (MADs). Meanwhile, during the same crisis period, although the industry factor has exhibited a significant increase in its importance in the early stage, this pattern does not maintain afterwards till recent years, especially during the second recovery period, in which the industry factor has exhibited an obvious upward trend but not as important as the country factor.

Are these results robust to different granularity of industry classification system? Figure C.7 through Figure C.12 in Appendix C have provided the time-series plots with industry and country factors estimated from industry returns on 39 FTSE Industry Sectors. The results are briefed as follows. Firstly, the dominance of the industry factor relative to the country factor has been strengthened for a sample consisting of all 33 countries and a sample comprising all 11 developed markets. Such a result is less prominent for the sample comprising all 22 emerging markets only. Secondly, analogous to Figure 5.7 through Figure 5.10, the industry factor has exhibited an obvious upward trend during the first recovery period both in plots for rolling means and rolling medians, as well as in two volatility measures, i.e., rolling standard deviations and rolling MADs.

In conclusion, in a dynamic framework, the country factor dominates the industry factor for emerging markets; while this is reversed in where developed markets are considered alone. For the latter case, the industry factor has exhibited an obvious upward trend in the first recovery period of the business cycles marked by National Bureau of Economic Research. Unfortunately, this pattern is less prominent in the second recovery period.

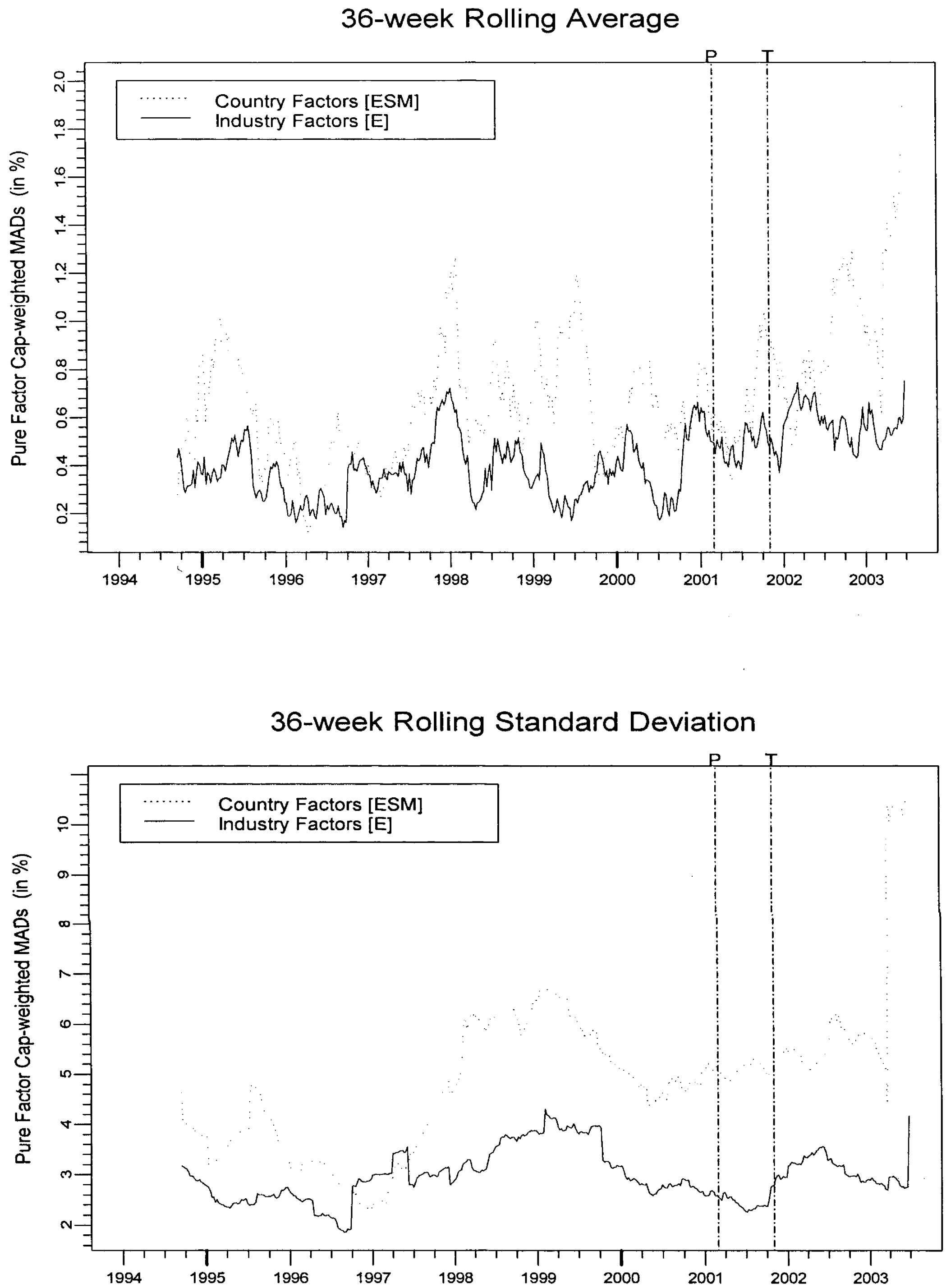
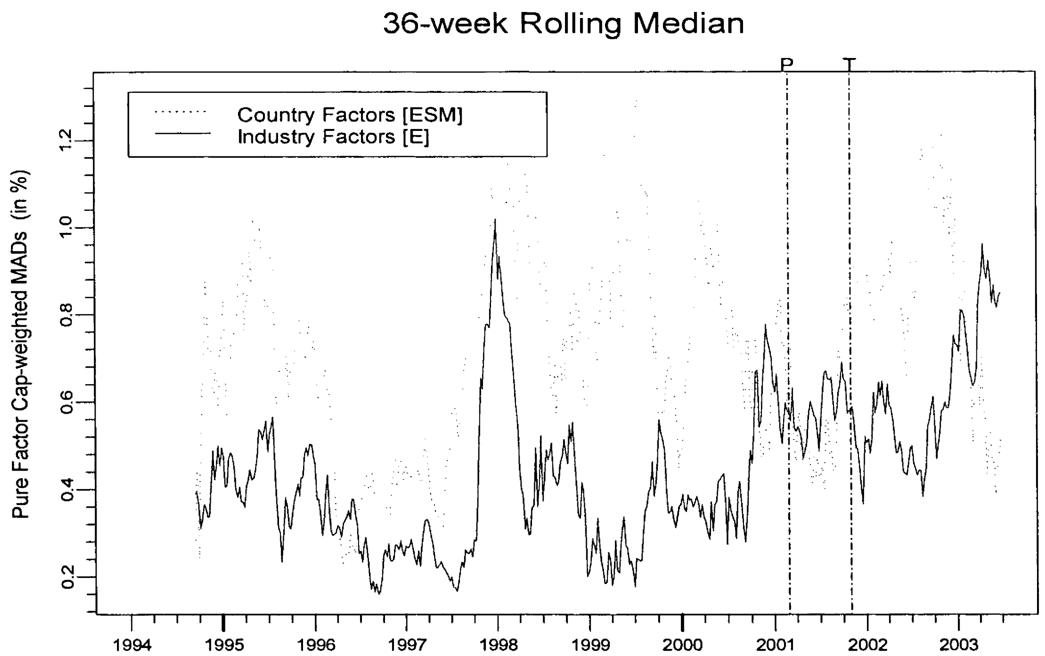


Figure 5.11. 36-week rolling averages and standard deviations of value-weighted aggregate industry (ten FTSE Economic Groups) and country factors (all 22 emerging markets) during the period 1994 – 2003.

In these plots, industry (country) factors are aggregated as the cross-sectional value-weighted absolute values of estimated factor loadings for all 10 FTSE Economic Groups (all 22 emerging markets). Capital-weights are computed using market capitalization at the beginning of a synthetic week (Wednesday-to-Wednesday) for the corresponding industries (markets). Within each rolling window, means and standard deviations are computed for each aggregate factor. "P" and "T" denote the peak and trough dates of the U.S. business cycles as identified by National Bureau of Economic Research during 1994 - 2004.



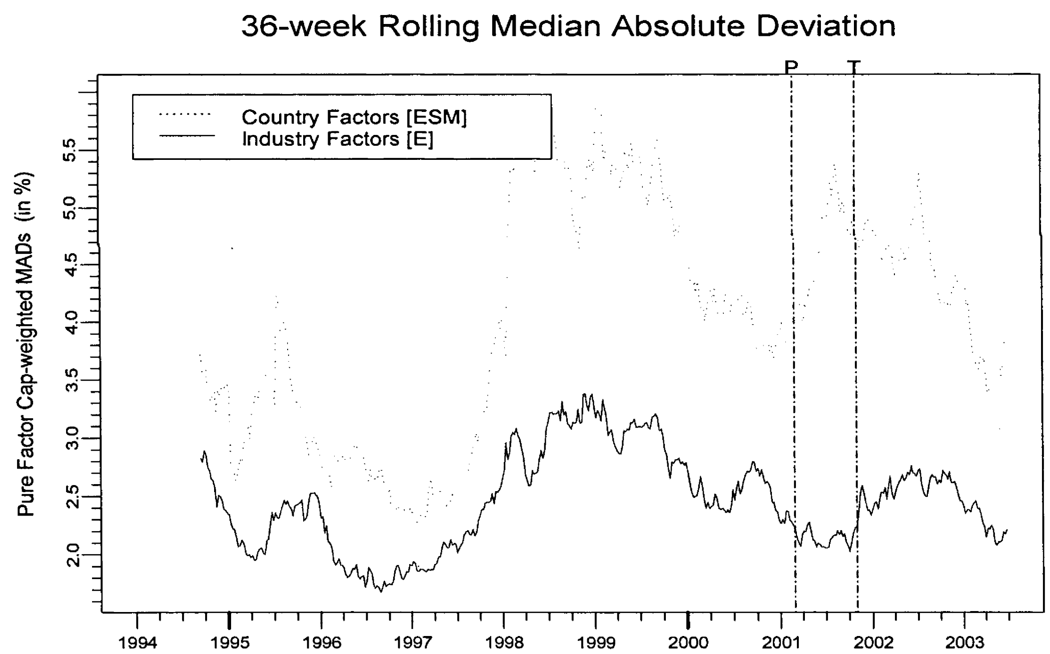


Figure 5.12. 36-week rolling medians and MADs of value-weighted aggregate industry (ten FTSE Economic Groups) and country factors (all 22 emerging markets) during the period 1994 – 2003.
In these plots, industry (country) factors are aggregated as the cross-sectional value-weighted absolute values of estimated factor loadings for all 10 FTSE Economic Groups (all 22 emerging markets). Capital-weights are computed using market capitalization at the beginning of a synthetic week (Wednesday-to-Wednesday) for the corresponding industries (markets). Within each rolling window, medians and median absolute deviations are computed for each aggregate factor. "P" and "T" denote the peak and trough dates of the U.S. business cycles as identified by National Bureau of Economic Research during 1994 - 2004.

5.4 Chapter Summary

This chapter has examined the relative importance of industry and country factors in determining market performance of 33 major stock markets via the dummy variable regression model of Heston and Rouwenhorst (1994) during the period 1994-2003. Sensitivity tests have also been implemented on two sub-samples, which consist of all 11 developed markets or all 22 emerging markets respectively, as well as two industry classification systems with different granularity.

Major empirical findings in this section are recapped as follows. Analysis based on conventional measures, such as variance ratio, suggests that (1) in developed markets, the industry factor is as important as the country factor in determining their respective market performance; (2) in emerging markets, however, the country factor still dominates the industry factor but less extreme as found in previous studies; (3) when all 33 markets are considered together, the country factor is marginally more important than industry factor, which suggests that the major source of the country factor is from emerging markets. This evidence also implies that despite the increased velocity in globalization of world economy, emerging markets are still segmented from world capital market.

Regression-based analysis has confirmed the above conclusion on a market-by-market basis. With a focus on each factor's contribution to average excess market returns, regression results have shown that average excess markets returns are determined largely by the excess returns on world market portfolio. The industry factor is important in developed markets. This phenomenon is more pronounced in a sub-sample where industry and country factors are strictly estimated from a sub-sample of developed markets. On the other hand, as regards emerging markets, the regression results suggest that emerging market returns are less sensitive to the industry factors estimated strictly from industry returns in emerging markets themselves than those estimated from a sample including both developed and emerging markets. This implies that important industry-shocks in emerging markets may be sourced from developed markets. Nonetheless, world market portfolio and country factors are still two important factors to formulate average market returns.

EGARCH regression results show that the country factor is also an important factor in explaining the variation in the unsystematic risk, represented by residuals from ICAPM that cannot be explained by world market portfolio. This evidence is more phenomenal in a couple of emerging markets than their developed counterparts. On the other hand, the industry factor is important in several developed markets but sparsely significant for emerging markets. In a two-factor model, the regression results suggest that after controlling for country factor, the industry factor emerges as an important factor contributing to the variation in the unsystematic risk. The above empirical results are also robust to the models where leverage is considered. Apart from that, The results reveal that when the country factor is considered along with leverage effect, both the number of countries with significant leverage coefficients and the magnitude of estimated coefficient for leverage effects have declined. This evidence may suggest that the country factor is an important source to the leverage effect.

Within a dynamic framework, the time-series plots for both equally- and capital-weighing schemes have confirmed the regression results that the industry factor dominates the country factor in developed market and this pattern is more pronounced during the later half of the sample period. In a direct contrast, for 22 emerging markets, the country factor still dominates the industry factor. Once again, these results suggest that emerging markets may be relatively segmented from world capital market than developed markets. However, when both developed and emerging markets are considered together, the mixed results are presented. That is, in an equally-weighting scheme, the country factor dominates industry factors; however, this pattern is reversed when capital-weighing scheme is considered. For the latter case, the plot result is not a surprise given the relatively big industry market capitalizations in developed markets. When examined in association with business cycles as documented by National Bureau of Economic Research, the industry factor estimated from developed markets has exhibited an obvious uptrend for its two risk premium measures as well as two volatility measures during the recovery period (defined as the period between the previous trough and this peak). In contrast, less clear pattern is reported for the only recession period. Further, such a pattern is more pronounced in the capital-weighting scheme under a finer industry classification system.

CHAPTER VI

EMPIRICAL RESULTS:
INDUSTRY, COUNTRY, AND REGIONAL FACTORS
IN
EMERGING MARKET PERFORMANCE

6.1 Introduction

To identify the factors driving emerging market performances has long posed a challenge to academics and investment practitioners. Conventional wisdom suggests that emerging markets are partially integrated with the world capital market. Thereby, country-specific factors are important in formulating the expected emerging market returns.

In recent years, as a result of the increased intra-regional trades and the coordination of macroeconomic policies among member countries of the regional organizations like the Association of Southeast Asian Nations (ASEAN), the increasing integration of regional financial markets has provoked fervent interests among academics and investment practitioners in examining the role of the regional factor in determining disparate market performances. This chapter attempts to complement the existing studies on the importance of the regional factor in pricing emerging market returns through an extended dummy variable regression model of Heston and Rouwenhorst (1994). This model admits a decomposition of a cross-sectional market return into its four components—a world, a country, a regional, and a value-weighted industry factors. Notably, the industry factors and the country factors that are used to extract the regional factor from the pure country returns (a sum of the world market benchmark return—the intercept—and the pure country factor for that country) in the second stage of the extended model are estimated from a sample consisting of all 33 stock markets in order to guarantee the global nature of the industry factors.

The remainder of this chapter is organized as follows. Section 6.2 introduces the 20 emerging markets used in this chapter. Summary statistics on the estimated industry, country and regional factors will be presented in Section 6.3. In the same section, the variance ratio analysis and two regression-based analyses have been employed to examine the relative importance of each factor in explaining the variation in realized emerging market returns and volatilities. Section 6.4, on the other hand, has examined the dynamic contribution of each factor with a focus on their respective aggregate forms. Section 6.5 summarizes the major findings of this chapter.

6.2 Selected Emerging Stock Markets

As documented in the existing literature, developed stock markets are more correlated with each other and integrated with the world capital market than their emerging counterparts. The empirical results in Chapter 5 have also confirmed this assertion. Thus, if both developed and emerging markets are mixed together and grouped according to their geographical affiliations, the estimated regional factors may be less pronounced due to the low correlations between developed and emerging stock markets within a region. Therefore, this chapter will focus on the regional factor in the context of emerging stock markets that are supposed to be regionally-integrated with each other.

Existing studies suggest that the strong regional factor in emerging markets may be attributed to (1) "contagion effect" (mostly taking place in emerging markets, see, e.g., Forbes and Rigobon (2002) and Bae, Karolyi and Stulz (2003), among others) during the regional financial crises; (2) the similarity of the industrial compositions of countries and the stock markets therein located in the same region (e.g., Roll (1992)); and, (3) the increased economic coordination at the regional level. Empirically, it is quite difficult to discern the reasons for the empirically-documented high correlations between the stock markets in the same region (see Claessens, Dornbusch and Park (2001)). As such, this chapter arbitrarily translates the common factors driving the stock markets in a region as the "regional factor."

In order to examine the relative importance of the regional factor in explaining the variation in emerging market returns and volatilities, a subset of 20 emerging markets are selected. They are: Korea, Taiwan/China, India, Pakistan, China, Indonesia, Malaysia, the Philippines, and Thailand—Asian emerging markets group; Czech Republic, Hungary, Poland, Turkey, and Russia—European emerging markets group; and, Brazil, Mexico, Argentina, Chile, Colombia, and Peru—Latin American emerging markets group.[76] Unfortunately, this country grouping strategy has its weaknesses. For example, it may be inappropriate to group India and Pakistan with other seven Asian emerging markets due to the low correlations between these two markets and other seven Asian countries as documented in Chapters 4 and 5. Consequently, the regional

[76] In other words, Israel and South Africa have been dropped from the subset of emerging markets used in this chapter for the reason that it is impossible to assign them to any one of the three regions. It is also not a good idea to group them as "others" without any plausible economic justifications to support this grouping strategy.

factor for Asia may be underestimated because of the inclusion of those two countries in Asian group.

As regards the industry factor, the coefficients for each industry dummy that are strictly estimated from a sample of all 33 stock markets will be used to represent their respective industry premia or industry factors. Through this method, the estimated industry factor is global in nature in that it reflects the industry innovations sourced from both developed and emerging market countries. Thereby, the pure country returns used to extract the regional factor in the second stage of the extended dummy variable regression model are also computed as a sum of the estimated world benchmark return, i.e., the intercept, and the country factor for each market from the same sample consisting of all 33 stock markets (refer to Section 3.3 of Chapter 3).

6.3 Full Sample Period Analysis

In what follows, the summary statistics on the estimated industry, regional and country factors from the two-stage dummy variable regression model and the associated tests on the contribution of each factor to the realized market returns and volatilities will be examined.

6.3.1 Summary Statistics for Estimated World, Country, and Regional Factors

Panel B of Table 6.1 presents the summary statistics for the regionally-adjusted country factor that is estimated from the extended dummy variable regression model during the period of 1994-2003. As a reference, Panel A of Table 6.1 has replicated the summary statistics for the country factor estimated from a sample consisting of all 33 stock markets without the adjustment for the regional factor (adapted from Table 5.2 of Chapter 5). The first five columns under "FTSE Economic Group" are the summary statistics for those factors estimated from the industry returns on ten broad FTSE Economic Groups. Meanwhile, the summary statistics for those factors estimated from the industry returns on the 39 refined FTSE Industry Sectors are reported in the last five columns under "FTSE Industry Sector."

Table 6.1

Summary Statistics of Value-Weighted World Benchmark Return, "Pure" Regional, and "Pure" Country Factors
(January 1994 - June 2003)

This table reports summary statistics for the value-weighted world benchmark return and "pure" country factors adjusted for regional factors, and "pure" regional factors within each market via a extended two-stage dummy variable regression model in the spirit of Heston and Rouwenhorst (1994), during the full sample period, i.e., January 1994 – June 2003. Besides the conventional measures, such as means and standard deviations, three robust measures of location, i.e., medians, trimmed means with 1% and 5% of extreme observations at both ends of a sorted data series removed, are also provided. Median absolute deviation is also provided as a robust measure of the dispersion of the data. Panel A is a replicate of the summary statistics on estimated country factors for 20 emerging markets using industry returns (from both versions of industry classification systems) available in all 33 countries. Panel B reports the summary statistics on the regional factors adjusted country factors. Meanwhile, Panel C summarizes the regionally-adjusted world benchmark return and three regional factors. Group means and medians are also offered for each region. All statistics are expressed in % per annum.

Panel A: "Pure" Country Factor Estimated in Chapter 5

		FTSE Economic Group						FTSE Industry Sector					
Region	Country	Mean	Stdev	Median	Trimmed Mean (1%)	Trimmed Mean (5%)	MAD	Mean	Stdev	Median	Trimmed Mean (1%)	Trimmed Mean (5%)	MAD
Asia	Korea	10.58	78.11	-8.74	-8.03	-11.98	37.57	-0.07	62.09	0.24	-7.55	-10.35	37.73
	Taiwan/China	-15.62	34.28	-17.74	-15.13	-15.71	29.01	-19.05	35.10	-18.06	-15.54	-16.30	27.87
	China	-4.23	39.20	-2.54	-4.79	-5.58	31.79	-0.41	42.18	-8.46	-3.49	-6.98	33.15
	Indonesia	-47.72	98.88	-15.35	-58.07	-43.01	50.27	-30.09	81.71	1.22	-33.47	-25.67	43.99
	Malaysia	-5.21	42.27	-11.75	-5.44	-9.53	29.10	-2.77	38.09	-5.09	-3.71	-3.72	29.27
	Philippines	-62.36	67.46	-66.50	-65.40	-69.89	43.42	-52.22	61.66	-50.86	-55.88	-61.60	43.77
	Thailand	-9.85	48.29	-13.88	-13.35	-12.08	35.34	-4.54	49.86	-6.65	-15.15	-16.32	36.61
	India	3.51	49.86	-10.47	-11.17	-13.64	31.83	-0.06	37.72	-5.34	-5.35	-8.38	30.38
	Pakistan	-11.91	43.18	-8.83	-10.63	-10.24	37.98	-8.50	43.87	-5.00	-7.39	-5.48	38.99
	Group Mean	**-15.87**	**55.72**	**-17.31**	**-21.33**	**-21.30**	**36.26**	**-13.08**	**50.25**	**-10.89**	**-16.39**	**-17.20**	**35.75**
	Group Median	**-9.85**	**48.29**	**-11.75**	**-11.17**	**-12.08**	**35.34**	**-4.54**	**43.87**	**-5.34**	**-7.55**	**-10.35**	**36.61**
Europe	Czech Republic	-5.91	31.02	-2.43	-6.15	-8.24	30.14	-17.59	38.71	3.48	-17.45	-17.22	36.58
	Hungary	-11.45	38.25	-0.93	-7.95	-0.80	30.84	-12.32	38.71	3.23	-10.16	-6.02	28.91
	Poland	-13.99	42.83	-11.43	-12.94	-9.87	32.62	-8.65	38.75	-11.68	-8.35	-8.48	32.72
	Russia	19.54	95.04	25.36	20.60	21.34	52.61	2.28	99.59	18.72	6.76	11.23	54.72
	Turkey	-5.47	65.44	8.83	-5.37	0.86	50.78	-8.83	61.20	4.85	-3.30	4.05	48.50
	Group Mean	**-3.46**	**54.52**	**3.88**	**-2.36**	**0.66**	**39.40**	**-9.02**	**55.39**	**3.72**	**-6.50**	**-3.29**	**40.29**
	Group Median	**-5.91**	**42.83**	**-0.93**	**-6.15**	**-0.80**	**32.62**	**-8.83**	**38.75**	**3.48**	**-8.35**	**-6.02**	**36.58**
Lat. America	Brazil	-43.34	60.57	-23.19	-38.11	-36.44	38.47	-37.53	51.32	-15.32	-29.66	-20.81	32.24
	Mexico	-15.74	42.89	-21.56	-12.72	-11.70	32.33	-19.64	42.17	-21.75	-19.48	-19.08	28.68
	Argentina	-17.48	46.89	-26.17	-16.04	-16.45	37.49	-12.40	45.02	-29.42	-13.05	-18.30	34.20
	Chile	-4.71	30.77	-13.88	-8.76	-10.61	23.36	-6.54	27.92	-23.28	-7.39	-10.12	23.61
	Colombia	-22.21	42.25	-22.02	-24.04	-25.98	33.51	-19.65	36.10	-14.27	-21.13	-22.88	28.49
	Peru	8.40	28.95	1.35	9.50	9.25	25.35	6.51	33.46	6.08	6.72	3.86	24.82
	Group Mean	**-15.85**	**42.05**	**-17.58**	**-15.03**	**-15.32**	**31.75**	**-14.87**	**39.33**	**-16.33**	**-14.00**	**-14.56**	**28.67**
	Group Median	**-16.61**	**42.57**	**-21.79**	**-14.38**	**-14.07**	**32.92**	**-16.02**	**39.13**	**-18.54**	**-16.27**	**-18.69**	**28.59**

Panel B: "Pure" Country Factor Adjusted for Regional Factor

Region	Country	FTSE Economic Group						FTSE Industry Sector					
		Mean	Stdev	Median	Trimmed Mean (1%)	Trimmed Mean (5%)	MAD	Mean	Stdev	Median	Trimmed Mean (1%)	Trimmed Mean (5%)	MAD
Asia	Korea	19.78	78.34	-8.34	2.34	-5.05	44.79	4.22	62.76	-8.91	-2.77	-10.54	47.20
	Taiwan/China	-6.43	40.09	-9.95	-6.21	-4.56	35.59	-14.76	42.83	12.82	-9.14	-8.76	35.41
	China	4.96	29.08	4.75	4.51	4.80	23.22	3.88	32.07	1.14	3.23	1.55	23.05
	Indonesia	-44.67	92.21	-35.51	-54.75	-46.28	50.99	-32.13	78.91	-15.77	-36.62	-34.67	41.06
	Malaysia	3.98	42.26	2.83	2.69	0.05	32.79	1.52	39.33	15.07	-0.19	-0.78	31.05
	Philippines	-59.30	61.58	-71.94	-60.21	-69.47	42.25	-54.26	58.32	-66.43	-59.24	-66.16	42.42
	Thailand	-1.05	46.40	5.96	-3.62	-4.80	34.86	-1.28	49.87	-14.68	-6.55	-15.07	37.12
	India	12.70	51.91	3.39	-0.53	-3.82	35.72	4.23	44.34	8.18	1.18	-2.31	37.84
	Pakistan	-2.72	32.87	4.33	-2.04	-1.04	25.76	-4.21	33.12	-0.02	-1.94	1.85	24.66
	Group Mean	**-8.08**	**52.75**	**-11.61**	**-13.09**	**-14.46**	**36.22**	**-10.31**	**49.06**	**-7.62**	**-12.45**	**-14.99**	**35.53**
	Group Median	**-1.05**	**46.40**	**2.83**	**-2.04**	**-4.56**	**35.59**	**-1.28**	**44.34**	**-0.02**	**-2.77**	**-8.76**	**37.12**
Europe	Czech Republic	-9.24	34.53	-12.02	-8.89	-7.52	22.98	-11.57	38.87	-21.38	-11.77	-11.64	28.62
	Hungary	-15.45	42.27	-0.29	-10.12	-8.17	28.17	-6.95	42.42	14.88	-3.74	-4.52	26.67
	Poland	-11.94	43.25	-10.60	-10.49	-9.85	27.61	-7.01	40.31	1.28	-6.05	-3.71	26.06
	Russia	14.58	69.35	14.86	14.11	14.53	44.06	6.19	73.45	20.03	13.49	14.32	48.23
	Turkey	-3.42	57.29	9.42	-2.03	2.59	43.14	-7.19	53.92	1.33	-3.18	3.70	43.15
	Group Mean	**-5.10**	**49.34**	**0.28**	**-3.48**	**-1.68**	**33.19**	**-5.31**	**49.79**	**3.23**	**-2.25**	**-0.37**	**34.54**
	Group Median	**-9.24**	**43.25**	**-0.29**	**-8.89**	**-7.52**	**28.17**	**-7.01**	**42.42**	**1.33**	**-3.74**	**-3.71**	**28.62**
Lat. America	Brazil	-30.97	62.02	-5.89	-24.48	-24.48	41.35	-24.48	50.88	1.50	-16.25	-9.15	34.91
	Mexico	-6.62	46.61	-4.67	-5.58	-6.15	40.25	-10.35	43.61	0.52	-11.56	-13.47	37.38
	Argentina	-8.36	42.51	-6.67	-6.19	-4.61	36.50	-3.11	40.12	-4.90	-3.41	-3.56	35.13
	Chile	4.41	34.45	-4.41	2.28	1.69	25.68	2.75	31.58	-5.15	0.96	0.17	27.82
	Colombia	-13.09	22.49	-10.51	-12.86	-12.15	17.37	-10.36	20.81	-12.48	-10.32	-9.64	15.12
	Peru	17.52	26.01	23.64	17.41	20.14	21.55	15.80	26.31	23.65	14.38	14.06	20.59
	Group Mean	**-6.18**	**39.02**	**-1.42**	**-4.90**	**-4.26**	**30.45**	**-4.96**	**35.55**	**0.52**	**-4.37**	**-3.60**	**28.49**
	Group Median	**-7.49**	**38.48**	**-5.28**	**-5.88**	**-5.38**	**31.09**	**-6.73**	**35.85**	**-2.19**	**-6.87**	**-6.35**	**31.36**

Panel C: Regionally-Adjusted World Benchmark Return and "Pure" Regional Factor

Region	FTSE Economic Group						FTSE Industry Sector					
	Mean	Stdev	Median	Trimmed Mean (1%)	Trimmed Mean (5%)	MAD	Mean	Stdev	Median	Trimmed Mean (1%)	Trimmed Mean (5%)	MAD
FTSE World	-7.51	22.28	-11.13	-7.57	-6.14	18.74	-3.71	20.78	-2.22	-3.52	-2.21	16.91
Asia	1.55	18.99	-1.73	0.92	-0.61	13.96	3.85	17.62	-1.63	2.96	0.07	12.55
Europe	8.69	43.02	11.95	7.71	6.87	35.04	6.51	38.60	12.21	6.03	6.84	31.79
Lat. America	1.62	17.40	4.11	1.11	1.03	14.82	-1.15	19.99	-1.34	-0.18	0.31	16.72

Under "FTSE Economic Group," the mean statistics for the country factor in Panel B indicate that almost all Asian and Latin American emerging markets, after being adjusted for their respective regional factors, have witnessed an improved (a positive increase in their magnitudes) performance relative to Panel A. Three markets, i.e., China, Malaysia, and Argentina, have witnessed the change of signs for their respective country factors from negative in Panel A to positive in Panel B. This evidence implies that on average, the regional factor has introduced a negative premium into average market returns of Asian and Latin American emerging markets. Therefore, the deterioration in the performance of these emerging markets in Asia and Latin America during the later sample period may be partly attributed to their respective regional financial crises. By contrast, only one European emerging market—Poland—has an improved performance from -13.99 percent p.a. in Panel A to -11.49 percent p.a. in Panel B, though not as significant as its Asian and Latin American counterparts. Meanwhile, other four European emerging markets have experienced the deterioration in their market performance, an average decrease of 4 percent p.a. relative to Panel A. Overall, most emerging markets, regardless of their regional affiliations, still exhibit the negative mean country factor. Measured as standard deviations, Panel B shows that after being adjusted for their respective regional factors, the country factor for most emerging markets still maintains the same high volatility level as in Panel A. This latter evidence may suggest that the country factor is still the major source for the variation in realized emerging market volatilities during the sample period of 1994-2003.

Given that the sample period examined in this thesis is quite volatile and means and standard deviations are sensitive to the existence of outliers in the sample, three robust measures of location, i.e., medians, 1 and 5 percent trimmed means, and one robust measure of dispersion—mean absolute deviation (with its center measured as median) are also reported for each factor in Panel B. The three robust measures of location under "FTSE Economic Group" offer mixed results for Asian and European emerging markets. Measured on a regional basis, on average, improved market performance is reported for both regions relative to Panel A. As of six Latin American emerging markets, however, robust statistics are more homogenous: All exhibit impressively improved performance. On the other hand, almost all MADs in Panel B indicate that standard deviations have overestimated the volatilities of the country factor due to the possible existence of outliers. Similar results are also present in Panel A. In general, MADs in Panel B are smaller in their magnitudes than the MADs in Panel A.

Hence, a comparison of robust volatility measures across two panels reveals that the regional factor may also be an important contributor to the variation in emerging market volatilities.

Are the above results robust to the country factor estimated under the refined industry classification? In order to address this issue, the last five columns of Panel B report the same summary statistics but for the country factor estimated from industry returns on 39 refined Industry Sectors. Under "FTSE Industry Sector," the mean statistics for the country factor in Panel B indicate that most emerging markets have also improved in their performance relative to Panel A, with only two exceptions, i.e., Indonesia and the Philippines, with marginally deteriorating performance. Measured as standard deviations, China, Pakistan, Russia, Turkey, and Colombia also have exhibited significant drops in the volatility of their respective country factors relative to Panel A. The magnitude of the drop is much greater than the case under "FTSE Economic Group." This evidence may reflect that the industries in emerging markets, under the refined industry classification system, are more sensitive to the regional factor than the case under the broad version of industry classification system. For example, during the financial crises periods, "Financials" industries are more vulnerable to the deteriorating fundamentals of the initiative country than other industries in that market. Further, through the regional contagion effect, financial industries in other regional markets also suffer from the ripple effect because international investors usually re-evaluate their investment in emerging markets on a regional basis. On the other hand, the robust measures of location and volatility report less homogenous results than those under "FTSE Economic Group."

Overall, the summary statistics for the country factor in Panel B (under both industry classification systems) suggest that the regional factor, measured as means and three robust measures of location, has introduced more uncertainties into the economic fundamentals of the emerging markets of Asia and Latin America. However, this phenomenon is less pronounced in European emerging markets. Interestingly, the volatility of the regionally-adjusted country factor, measured as standard deviations and MADs, does not decline significantly as expected. In some markets, this adjustment has even increased the volatility of their respective country factors. Therefore, the evidence in Panel B implies that the regional factor plays an important role in determining the emerging market performance during the period of 1994-2003. However, the regional factor is not as important as the country factor in terms of its contribution to the variation of the realized emerging market returns.

Panel C of Table 6.1 also reports the summary statistics for the regionally-adjusted world benchmark return (a proxy for world market factor) and for the regional performance of Asia, Europe, and Latin America during the period of 1994-2003. Under "FTSE Economic Group," the summary statistics for the regionally-adjusted world benchmark return are almost identical to those for the world benchmark return estimated from a sub-sample comprising all 22 emerging markets (see Table 5.2 in Chapter 5).

Means and standard deviations for the regional factor in Panel C show that Asia and Latin America have almost identical performance during the sample period. Europe, however, has its own distinctive performance with relatively high average regional premium of 8 percent p.a. and regional volatility of 43.02 percent p.a., almost twice the magnitude of the other two regions. When robust measures of location and dispersion are used, Asia exhibits less lucrative performance than their European and Latin American counterparts. For example, measured as median and 5 percent trimmed mean, Asian region has exhibited negative regional premia, about -1.73 and -0.61 percent p.a., respectively. In contrast, Europe far outperforms other two regions, with its regional premium ranging from 6.87 percent p.a. (measured as 5 percent trimmed mean) to 11.95 percent p.a. (measured as median). MADs, a robust measure of dispersion, exhibit the same results as standard deviations but with reduced magnitudes. The less lucrative regional performance of Asia and Latin America, relative to Europe during the period of 1994-2003 may suggest: On the one hand, the decades' efforts made by governments of Asian and Latin American countries to open and stabilize their capital markets have succeeded, which leads to a lower regional premium and volatility than their European counterparts (Bekaert and Harvey (1995); Bekaert and Harvey (1997)). On the other hand, from the perspective of regional financial crises and the associated contagion effect, a comparison between non-robust and robust summary statistics in Panel C reveals that financial crises are less persistent in Asia and Latin America than they are in European emerging markets. It is largely due to the increasingly solidifying economic fundamentals of Asian and Latin American emerging markets via their experience in battles against numerous financial crises in 1980s and early 1990s. Nonetheless, the distinctive regional performance is also attributed to the fact that quite few cross-sectional industry returns are available for European emerging markets in the beginning of the sample period. Hence, the resulting European regional factor may be confounded with the country factors of Turkey and Poland that have full-sample period of observations, which leads to distinctive regional premium and volatility.

Similar results are also reported for the world and regional factors estimated from the refined industry classification system in Panel C under "FTSE Industry Sector" that Europe has relatively higher mean regional premium, accompanied by higher volatility, than Asia and Latin America. The regionally-adjusted world factor is less extreme than the case under "FTSE Economic Group" with marginally improvement in its performance.

When Panel B and Panel C of Table 6.1 are examined together, both standard deviations and MADs for the country factor indicate that Asian and Latin American emerging markets have much greater volatility in the country factor than their respective regional factors, indicating the dominance of the country factor in these emerging markets. In contrast, some European countries have less volatile country factors than the European regional factor.

In conclusion, the summary statistics on the estimated country, regional and world market factors in Table 6.1 suggest that the regional factor may be an important contributor to the variation in emerging market returns but second to the country factor in Asian and Latin American emerging markets. In contrast, the performances of European emerging markets may be dominated by their regional factor. This empirical evidence is quite robust to industry classification with different level of granularity.

6.3.2 Variance Ratio Analysis

In this section, variance ratio (VR) analysis is employed to investigate the contribution of industry, country and regional factors to the variation in the realized market returns of 20 emerging markets during the period of 1994-2003.

Table 6.2

Decomposition of U.S. Dollar-Denominated Excess Country Returns into Its Industry, Country, and Regional Components (January 1994 – June 2003)

This table presents the standard deviations (expressed in percentage per week) and variance ratios of the industry and country components of U.S. dollar-denominated, value-weighted excess industry (10 FTSE Economic Groups) and country index returns over a value-weighted world benchmark return during the full sample period, i.e. from January 1994 through June 2003. Continuously compounded raw returns for each industry sector are measured at a weekly frequency (Wednesday-to-Wednesday). In Panel A, each excess industry return is decomposed into a pure industry effect, and a value-weighted sum of country effects, estimated from a dummy variable regression model of Heston and Rouwenhorst (1994). The standard deviations are computed for each component. The variance ratio relative to the market gives the ratio of the variance of that component to the variance of index return in excess of the value-weighted benchmark world. In a similar fashion, in Panel B, each excess country return is also decomposed into a pure country effect and a value-weighted sum of industry effects classified by the ten broad FTSE Economic Groups. In each panel, along with the sample standard deviations and variance ratios for industry and country effects estimated from all 33 markets (under column titled as "All Sample Markets"), sample countries are further grouped into two groups according to the maturity of the market. That is, "DSM" group, which is composed of 11 developed stock markets; and, "ESM" group, which is composed of 22 emerging stock markets. Under column "Developed (Emerging) Markets Only," standard deviations and variance ratios are also provided for industry and country effects estimated independently from those two groups as a comparison. Cross-country and cross-industry means (medians) are computed as arithmetic averages (medians) of respective effects across countries and 10 FTSE Economic Groups.

Panel A: Decomposition of Excess Country Returns into Industry and Country Components as in Chapter 5

Region	Country	FTSE Economic Group								FTSE Industry Sector							
		All Sample Markets				Emerging Markets Only (ESM)				All Sample Markets				Emerging Markets Only (ESM)			
		Cum. Industry Effects		Pure Country Effect		Cum. Industry Effects		Pure Country Effect		Cum. Industry Effects		Pure Country Effect		Cum. Industry Effects		Pure Country Effect	
		Stdev (%)	Var. Ratio	Stdev (%)	Var. Ratio	Std. Dev.	Var. Ratio	Stdev (%)	Var. Ratio	Stdev (%)	Var. Ratio	Stdev (%)	Var. Ratio	Stdev (%)	Var. Ratio	Stdev (%)	Var. Ratio
Asia	Korea	1.53	0.07	10.83	3.57	1.53	0.08	9.41	2.84	1.39	0.06	8.61	2.23	1.67	0.09	7.86	2.09
	Taiwan/China	1.79	0.17	4.75	1.21	2.09	0.24	4.73	1.23	1.79	0.17	4.87	1.28	2.15	0.29	4.94	1.52
	China	0.95	0.03	5.44	1.09	1.10	0.04	5.78	1.11	1.57	0.09	5.85	1.23	1.78	0.11	6.13	1.36
	Indonesia	1.82	0.05	13.71	2.85	1.76	0.05	12.86	2.80	1.95	0.06	11.33	2.00	1.98	0.07	10.58	1.92
	Malaysia	0.86	0.03	5.86	1.29	0.91	0.04	5.43	1.35	1.38	0.07	5.28	1.07	1.37	0.09	4.76	1.10
	Philippines	1.19	0.05	9.35	3.10	1.13	0.05	8.67	2.99	2.70	0.27	8.55	2.72	2.45	0.26	8.06	2.79
	Thailand	1.22	0.03	6.70	0.94	1.11	0.03	6.23	0.96	1.34	0.04	6.91	1.05	1.27	0.04	6.40	1.07
	India	0.93	0.05	6.92	2.78	1.12	0.06	6.93	2.29	1.08	0.07	5.24	1.59	1.59	0.14	5.39	1.58
	Pakistan	1.63	0.08	5.99	1.08	1.35	0.06	5.95	1.07	1.49	0.07	6.08	1.11	1.48	0.07	5.81	1.11
	Region Average	***1.32***	***0.06***	***7.73***	***1.99***	***1.34***	***0.07***	***7.33***	***1.85***	***1.63***	***0.10***	***6.97***	***1.59***	***1.75***	***0.13***	***6.66***	***1.62***
	Region Median	***1.22***	***0.05***	***6.70***	***1.29***	***1.13***	***0.05***	***6.23***	***1.35***	***1.49***	***0.07***	***6.08***	***1.28***	***1.67***	***0.09***	***6.13***	***1.52***
Europe	Czech Republic	2.26	0.30	4.30	1.09	2.01	0.20	4.66	1.06	1.56	0.14	5.37	1.71	1.25	0.09	5.59	1.80
	Hungary	1.64	0.15	5.30	1.53	1.31	0.08	5.66	1.48	1.42	0.11	5.36	1.58	1.64	0.15	5.46	1.69
	Poland	1.37	0.07	5.94	1.30	1.39	0.07	6.25	1.35	1.45	0.08	5.37	1.06	1.65	0.10	5.33	1.03
	Russia	2.32	0.07	13.18	2.22	2.12	0.07	12.72	2.40	1.38	0.03	8.49	1.08	1.41	0.03	8.52	1.10
	Turkey	1.05	0.02	9.08	1.26	1.20	0.02	9.20	1.26	2.81	0.10	13.81	2.47	2.70	0.11	13.04	2.56
	Region Average	***1.73***	***0.12***	***7.56***	***1.48***	***1.60***	***0.09***	***7.70***	***1.51***	***1.72***	***0.09***	***7.68***	***1.58***	***1.73***	***0.10***	***7.59***	***1.64***
	Region Median	***1.64***	***0.07***	***5.94***	***1.30***	***1.39***	***0.07***	***6.25***	***1.35***	***1.45***	***0.10***	***5.37***	***1.58***	***1.64***	***0.10***	***5.59***	***1.69***
Lat. America	Brazil	1.56	0.07	8.40	2.13	1.19	0.05	7.30	1.95	1.44	0.06	7.12	1.58	1.06	0.04	6.14	1.49
	Mexico	2.01	0.19	5.95	1.62	1.89	0.19	5.44	1.55	1.25	0.07	5.85	1.57	1.19	0.08	5.06	1.51
	Argentina	1.91	0.13	6.50	1.47	1.57	0.10	6.22	1.53	2.25	0.18	6.24	1.37	2.17	0.20	5.60	1.35
	Chile	1.65	0.23	4.27	1.55	1.47	0.16	4.48	1.47	1.73	0.26	3.87	1.28	1.64	0.23	3.86	1.26
	Colombia	1.28	0.08	5.86	1.59	1.44	0.08	6.04	1.47	1.60	0.12	5.01	1.18	1.59	0.12	5.07	1.19
	Peru	1.70	0.15	4.02	0.86	1.54	0.12	4.21	0.89	2.11	0.24	4.64	1.17	1.78	0.18	4.61	1.20
	Region Average	***1.68***	***0.14***	***5.83***	***1.54***	***1.52***	***0.12***	***5.61***	***1.48***	***1.73***	***0.16***	***5.45***	***1.36***	***1.57***	***0.14***	***5.06***	***1.33***
	Region Median	***1.67***	***0.14***	***5.90***	***1.57***	***1.51***	***0.11***	***5.74***	***1.50***	***1.67***	***0.15***	***5.43***	***1.32***	***1.61***	***0.15***	***5.07***	***1.31***

Panel B: Decomposition of Excess Country Returns into Industry, Country and Regional Components via Extended Model

Region	Country	FTSE Economic Group						FTSE Industry Sector					
		Cum. Industry Effects		Pure Country Effect		Pure Regional Effect		Cum. Industry Effects		Pure Country Effect		Pure Regional Effect	
		Stdev (%)	Var. Ratio	Stdev (%)	Var. Ratio	Stdev (%)	Var. Ratio	Stdev (%)	Var. Ratio	Stdev (%)	Var. Ratio	Stdev (%)	Var. Ratio
Asia	Korea	1.53	0.06	10.86	3.11	2.63	0.18	1.39	0.06	8.70	2.23	2.44	0.18
	Taiwan/China	1.79	0.14	5.56	1.38	2.63	0.31	1.79	0.16	5.94	1.79	2.44	0.30
	China	0.95	0.04	4.03	0.76	2.63	0.32	1.57	0.13	4.45	1.08	2.44	0.33
	Indonesia	1.82	0.06	12.79	2.77	2.63	0.12	1.95	0.07	10.94	2.17	2.44	0.11
	Malaysia	0.86	0.03	5.86	1.35	2.63	0.27	1.38	0.08	5.45	1.31	2.44	0.26
	Philippines	1.19	0.06	8.54	3.00	2.63	0.29	2.70	0.34	8.09	3.01	2.44	0.28
	Thailand	1.22	0.03	6.43	0.87	2.63	0.15	1.34	0.04	6.92	1.10	2.44	0.14
	India	0.93	0.04	7.20	2.49	2.63	0.33	1.08	0.06	6.15	2.05	2.44	0.32
	Pakistan	1.63	0.11	4.56	0.85	2.63	0.28	1.49	0.09	4.59	0.88	2.44	0.25
	Region Average	***1.32***	***0.06***	***7.31***	***1.84***	***2.63***	***0.25***	***1.63***	***0.12***	***6.80***	***1.74***	***2.44***	***0.24***
	Region Median	***1.22***	***0.06***	***6.43***	***1.38***	***2.63***	***0.28***	***1.49***	***0.08***	***6.15***	***1.79***	***2.44***	***0.26***
Europe	Czech Republic	2.26	0.23	4.79	1.02	5.97	1.59	1.56	0.13	5.39	1.56	5.35	1.54
	Hungary	1.64	0.10	5.86	1.32	5.97	1.37	1.42	0.10	5.88	1.66	5.35	1.37
	Poland	1.37	0.05	6.00	1.00	5.97	0.99	1.45	0.07	5.59	1.00	5.35	0.91
	Russia	2.32	0.06	9.62	1.05	5.97	0.41	2.81	0.10	10.19	1.35	5.35	0.37
	Turkey	1.05	0.02	7.94	0.88	5.97	0.50	1.37	0.03	7.48	0.82	5.35	0.42
	Region Average	***1.73***	***0.09***	***6.84***	***1.06***	***5.97***	***0.97***	***1.72***	***0.09***	***6.91***	***1.28***	***5.35***	***0.92***
	Region Median	***1.64***	***0.06***	***6.00***	***1.02***	***5.97***	***0.99***	***1.45***	***0.10***	***5.88***	***1.35***	***5.35***	***0.91***
Lat. America	Brazil	1.56	0.07	8.60	2.07	2.41	0.16	1.44	0.06	7.06	1.51	2.77	0.23
	Mexico	2.01	0.15	6.46	1.51	2.41	0.21	1.25	0.07	6.05	1.54	2.77	0.32
	Argentina	1.91	0.14	5.89	1.28	2.41	0.22	2.25	0.20	5.56	1.22	2.77	0.30
	Chile	1.65	0.20	4.78	1.67	2.41	0.43	1.73	0.26	4.38	1.63	2.77	0.65
	Colombia	1.28	0.13	3.12	0.79	2.41	0.47	1.60	0.20	2.89	0.65	2.77	0.60
	Peru	1.70	0.17	3.61	0.76	2.41	0.34	2.11	0.28	3.65	0.83	2.77	0.48
	Region Average	***1.68***	***0.14***	***5.41***	***1.35***	***2.41***	***0.30***	***1.73***	***0.18***	***4.93***	***1.23***	***2.77***	***0.43***
	Region Median	***1.67***	***0.14***	***5.34***	***1.40***	***2.41***	***0.28***	***1.67***	***0.20***	***4.97***	***1.36***	***2.77***	***0.40***

Notably, the industry and country factors used to extract the regional factor via the second stage of the extended dummy variable regression model are estimated from a sample consisting of all 33 markets in order to guarantee the global nature of industry factor. Panel B of Table 6.2 provides the variance ratio analysis results. The first six columns under "FTSE Economic Group" report the results for each factor estimated from industry returns on ten broad FTSE Economic Groups. Standard deviations are expressed in percentage per week. Regional means and medians are also used as a rough indicator to compare the performance of each factor on a regional basis. As a comparison, Panel A reports the standard deviations and variance ratios for the country and value-weighted (cumulative) industry factors of 20 emerging markets without the adjustment for the regional component contained in world benchmark returns and country factors (a replicate of Table 5.4 of Chapter 5).[77]

Under the broad industry classification system, Panel B shows that the country factor, after being adjusted for its regional component, still explains a significant proportion of the variation in the excess market returns above the regionally-adjusted world benchmark return, followed by regional factor. Industry factor, measured in its value-weighted cumulative form, explains the least, on average, ranging from 6 percent for Asian emerging markets to 14 percent for Latin American emerging markets. A closer look at Panel B reveals that the proportion explained by the regional factor in Asia and Latin America is quite homogenous across their respective constituent markets and only a small proportion of the variation in excess market returns is explained. In contrast, European regional factor explains a sizable proportion of the variation in the excess market returns of six European emerging markets, almost identical to the proportion explained by their respective country factor. Further, the proportion explained by the regional factor also varies significantly among six European emerging markets, ranging from 0.41 (Russia) to 1.59 (Czech Republic). On average, about 97 percent (or 99 percent, measured as median) of the variation is explained by European regional factor, which is much higher than other two regions. For some European emerging markets, such as Czech Republic, Hungary, and Poland, the regional factor is as important as or even dominates country factor. The above empirical evidence

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[77] Industry and country factors used in Panel A of Table 6.2 are estimated from industry returns on ten FTSE Economic Groups and 39 FTSE Industry Sectors via a sample consisting of 33 markets, presented under "All Sample Markets," as well as a sample consisting of 22 emerging markets, presented under "Emerging Markets Only (ESM)."

corroborates the analysis based on summary statistics that the regional factor may be more important in European emerging markets than those in Asia and Latin America. It is also interesting to see that three major economic players in Latin America, i.e., Brazil, Mexico, and Argentina, have less proportion of the variation in their respective excess market returns explained by regional factor. Similar pattern also exists among Asian and European emerging markets. This evidence may reflect the fact that small emerging market economies are more regionally integrated than the big economies in the same region.

Panel B also shows that industry factor, however, only explains a small proportion of the variation in excess emerging market returns, ranging from 6 percent for Asia to 14 percent for Latin America, indicative of the insignificant role of the industry factor in emerging markets relative to country and regional factors.

A comparison of variance ratios between Panel B and those under "All Sample Markets" in Panel A reveals that on a regional basis, the proportion explained by the country factor has reduced when its regional component has been removed. Europe has witnessed the largest decline, about 0.30 percent p.a. reduction in its regional mean and median. Meanwhile, Asia has exhibited the least drop in regional average; the median even indicates that the country factor has gained its importance from 1.29 in Panel A to 1.38 in Panel B. On the other hand, the proportions explained by the industry factor for each emerging market and for each region in both panels are not so much different from each other. Similar results also emerge from a comparison between variance ratios in Panel B and those under "Emerging Markets Only."

The insignificant proportion of the variation in excess market returns explained by the industry factor may be attributed to the failure of a broad industry classification to capture the variation in industries (Griffin and Karolyi (1998)). Therefore, in what follows, the variance ratio analysis is implemented on those factors estimated from industry returns under refined industry classification system—39 FTSE Industry Sectors. The results are presented in columns under "FTSE Industry Sector" in Panel A and Panel B of Table 6.2.

Under "FTSE Industry Sector," results in Panel B indicate that the country factor still dominates industry and regional factors in explaining the variation in excess market returns. The contribution of the regional factor to the variation in Asian and European emerging market returns are almost identical to those under "FTSE Economic Group." Latin America, however, has increased proportion of the variation in its excess regional market returns explained by regional factor, about 43 percent on average (40 percent, median).

As regards industry factor, Asia and Latin America have increased proportion in the variation of their excess market returns explained by the industry factor but not as significant as expected.

A comparison between Panel A and Panel B shows a moderate increase in the proportion explained by the industry factor in Panel B where the regional factor is explicitly considered. Further, Panel B also shows that Asian emerging markets have increased their exposures to the country factor relative to Panel A, after the adjustment for the regional component in country factor. On the other hand, European emerging markets have experienced a comparatively large reduction in their exposures to the country factor relative to Panel A, suggestive of the important role of the regional factor in Europe. Latin America has also experienced a moderate decline. These results are invariant to which sample of markets is used to estimate each factor.

Overall, variance ratios in Table 6.2 suggest that the country factor is still very important in explaining the variation in excess market returns for most emerging markets. Coupled with that, the regional factor has also gained its importance. The dominance of the country factor is less prominent in the five European emerging markets than their Asian and Latin American counterparts. Industry factor, however, is still a less important contributor than country and regional factors, consistent with the empirical findings in Serra (2000) with a different methodology from this thesis.

6.3.3 Regression-based Analysis

As argued in Chapter 5, the estimated regional and regionally adjusted country factors in the second stage of the extended dummy variable regression model can be roughly interpreted as returns on two factor mimicking portfolios with their maximum exposures to regional and country factors. This section will proceed to investigate each factor's contribution to the emerging market performance based upon several regression models that have explicitly incorporated each factor into their respective model specification. In each model, the industry factor is formulated as a value-weighted sum of cross-sectional factor loadings for all industries available in each market. Thus, the resulting industry factor is reflective of the differences in industrial composition of each market.

In order to save space, regression results are presented and discussed for industry, country, and regional factors estimated from industry returns on ten FTSE Economic Groups. As regards those factors estimated from industry returns on 39 finely-partitioned FTSE Industry Sectors, only major findings are discussed and regression results are presented in Appendix D.

A. Average Emerging Market Returns

This part will examine the relative importance of industry, country and regional factors in determining average market returns. In the same spirit of Chapter 5, the regression models are specified as ICAPM augmented by various combinations of four factors:

Benchmark Model—Single-factor model:

$$r_{k,t} = \alpha_k + \beta_k r_{FTSE,t};$$

Model I—Two-factor (country) model:

$$r_{k,t} = \alpha_k + \beta_k r_{FTSE,t} + [\text{Country Factor}]_{k,t} \quad ;$$

Model II—Two-factor (region) model:

$$r_{k,t} = \alpha_k + \beta_k r_{FTSE,t} + [\text{Regional Factor}]_{k,t} \quad ; \text{ and,}$$

Model III—Four-factor model:

$$r_{k,t} = \alpha_k + \beta_k r_{FTSE,t} + [\text{Country Factor}]_{k,t} + [\text{Regional Factor}]_{k,t} + [\text{Industry Factor}]_{k,t} \quad .$$

Table 6.3 reports the OLS regression results. Heteroscedasticity and autocorrelation consistent errors are reported in square brackets for the estimated coefficients for each factor. As a convention, adjusted R^2s are reported for each model as an indicator for model selection. Therefore, for each market, a higher adjusted R^2 indicates a preference for the specific permutation of each factor in that model.

Table 6.3

Time Series Regression (OLS) of Excess Country Index Return (U.S. Dollar-Denominated) on Excess World Market Index Return, Value-Weighted [Cumulative] Industry, Country and Regional Factors within a Sub-Sample of 20 Emerging [Stock] Markets (January 1994 – June 2003)

This table reports the estimated coefficients for each factor, i.e., a world market factor (FTSE), a country factor (CNT), a value-weighted [cumulative] industry factor (IND), and a regional factor (REGN), from the OLS regression for each country. Newy and West (1987) heteroscedasticity and autocorrelation consistent (HAC) standard errors are reported for each coefficient (in square brackets), along with some residual diagnostics for four time series regression models specified for each country. Three time series regressions models are: Model I—ICAPM + Country Factor: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t} +$ [Country Factor]$_{k,t}$; Model II—ICAPM + Regional Factor: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t} +$ [Regional Factor]$_{k,t}$; and, Model III—ICAPM + Country Factor + Regional Factor + Industry Factor: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t} +$ [Country Factor]$_{k,t}$+ [Regional Factor]$_{k,t}$+ [Industry Factor]$_{k,t}$. ICAPM model is used as the benchmark model. r_k (r_{FTSE}) is the weekly excess return of country k (a world market portfolio) above a one-week Eurodollar deposit rate. Cumulative industry factors, country factors and regional factors are estimated from a two-stage dummy variable regression of Heston and Rouwenhorst (1994). That is, in the first stage, value-weighted cumulative industry via the dummy variable regression model, in which both country and industry dummies are considered and weekly, U.S. dollar-denominated industry returns on all available FTSE Economic Group indices in all sample markets (33) are used. In a second stage, country and regional effects are estimated from the country returns, net off industry factors, via a similar dummy variable regression model, in which only regional dummies are included within a sub-sample of 20 emerging markets. Capital-weights are computed by using market capitalization at the beginning of the synthetic week (Wednesday-to-Wednesday) for each available Economic Group index within each market. Adjusted (Adj.) R^2 is reported for each model specification in each country as an indicator of the explanatory power of that model. Residual diagnostics are also reported: Jarque-Bera statistic (JB-stat) is indicative of normality of the residuals; and, Ljung-Box statistic (LB-stat) tests for the serial correlation in the residuals. Significance at the 1% level is denoted by ***, at the 5% level by **, and at the 10% level by *.

Region	Country	Benchmark: ICAPM				Model I: ICAPM + Country Factor					Model II: ICAPM + Regional Factor					Model III: ICAPM + Country Factor + Regional Factor + Industry Factor						
		FTSE	Adj. R-sq.	JB-stat	LB-stat	FTSE	CNT	Adj. R-sq	JB-stat	LB-stat	FTSE	REGN	Adj. R-sq	JB-stat	LB-stat	FTSE	CNT	REGN	IND	Adj. R-sq	JB-stat	LB-stat
	Korea	1.222***	0.179	397.509***	67.556***	1.030***	0.229**	0.339	1284.952***	53.937***	1.237***	0.212**	0.186	373.079***	65.963***	1.056***	0.244*	0.356***	-0.345**	0.368	2285.665***	43.225**
		[0.136]				[0.124]	[0.113]				[0.135]	[0.099]				[0.126]	[0.127]	[0.125]	[0.156]			
	Taiwan/China	0.737***	0.126	36.257***	15.459	0.651***	0.295***	0.262	25.025***	25.675	0.749***	0.164**	0.133	38.923***	14.294	0.665***	0.399***	0.514***	<0.000	0.338	48.990***	21.376
		[0.083]				[0.077]	[0.046]				[0.082]	[0.076]				[0.077]	[0.049]	[0.103]	[0.110]			
	China	0.253***	0.009	211.808***	33.822	0.295***	0.720***	0.344	51.851***	39.938**	0.313***	0.840***	0.202	98.934***	26.663	0.360***	0.714***	0.826***	>0.000	0.531	8.476**	28.874
		[0.098]				[0.088]	[0.098]				[0.091]	[0.122]				[0.075]	[0.076]	[0.089]	[0.234]			
	Indonesia	0.521***	0.021	194.825***	29.811	0.292**	0.426***	0.476	201.696***	61.906***	0.540***	>0.000	0.031	147.202***	26.911	0.314**	0.428***	0.362**	>0.000	0.490	324.822***	55.460***
		[0.176]				[0.129]	[0.054]				[0.173]	[0.241]				[0.123]	[0.061]	[0.172]	[0.119]			
Asia	Malaysia	0.498***	0.043	1199.693***	40.572**	0.312***	0.526***	0.416	158.353***	56.139***	0.527***	0.398**	0.085	875.241***	36.449*	0.299***	0.577***	0.627***	-0.738***	0.530	39.314***	30.958
		[0.104]				[0.081]	[0.064]				[0.104]	[0.161]				[0.073]	[0.055]	[0.099]	[0.242]			
	Philippines	0.515***	0.054	258.800***	32.178	0.430***	0.310***	0.314	85.970***	35.229*	0.531***	0.256*	0.071	222.797***	29.147	0.448***	0.307***	0.210*	>0.000	0.325	90.163***	33.681
		[0.126]				[0.092]	[0.050]				[0.127]	[0.145]				[0.093]	[0.050]	[0.126]	[0.176]			
	Thailand	1.003***	0.094	75.815***	60.122***	0.825***	0.554***	0.342	57.464***	50.457***	1.035***	0.483***	0.125	75.960***	56.153***	0.852***	0.579***	0.614***	<0.000	0.394	81.934***	54.874***
		[0.191]				[0.156]	[0.056]				[0.195]	[0.174]				[0.160]	[0.054]	[0.124]	[0.264]			
	India	0.275***	0.021	21.893***	32.778	0.298***	0.160**	0.108	238.838***	36.505*	0.289***	0.199***	0.037	22.632***	31.597	0.330***	0.195**	0.346***	<0.000	0.157	696.959***	32.929
		[0.088]				[0.086]	[0.079]				[0.085]	[0.064]				[0.080]	[0.097]	[0.088]	[0.199]			
	Pakistan	0.112	0.000	105.850***	28.607	>0.000	0.794***	0.458	52.182***	46.540***	>0.000	0.519***	0.063	114.169***	39.029**	0.166**	0.878***	0.785***	0.512***	0.601	31.494***	33.006
		[0.112]				[0.086]	[0.059]				[0.106]	[0.142]				[0.072]	[0.049]	[0.089]	[0.114]			
	Czech Republic	0.571***	0.106	0.642	34.057	0.623***	0.156**	0.136	2.959	32.944	0.472***	0.192***	0.167	1.451	30.728	0.507***	0.374***	0.364***	>0.000	0.297	0.762	29.870
		[0.099]				[0.097]	[0.078]				[0.093]	[0.042]				[0.082]	[0.055]	[0.049]	[0.093]			
	Hungary	0.860***	0.229	10.478***	32.275	0.913***	0.159***	0.268	5.182*	32.886	0.752***	0.191***	0.282	22.596***	31.037	0.766***	0.347***	0.375***	>0.000	0.424	5.167*	41.627**
		[0.120]				[0.124]	[0.036]				[0.112]	[0.048]				[0.104]	[0.046]	[0.042]	[0.111]			
Europe	Poland	0.840***	0.109	592.333***	56.623***	0.862***	0.393***	0.301	147.368***	44.870**	0.692***	0.285***	0.205	946.148***	38.604*	0.602***	0.605***	0.527***	>0.000	0.587	11.630***	28.444
		[0.114]				[0.124]	[0.073]				[0.115]	[0.079]				[0.097]	[0.050]	[0.042]	[0.132]			
	Russia	1.203***	0.103	100.776***	39.387**	0.831***	0.602***	0.484	211.401***	33.932*	0.800***	0.732***	0.295	45.152***	36.139*	0.713***	0.523***	0.341***	>0.000	0.516	292.965***	28.444
		[0.242]				[0.173]	[0.079]				[0.182]	[0.109]				[0.165]	[0.081]	[0.094]	[0.170]			
	Turkey	1.004***	0.063	50.190***	30.336	1.016***	0.620***	0.410	129.313***	33.923	0.705***	0.574***	0.224	39.097***	32.844	0.649***	0.665***	0.647***	-0.507*	0.624	2247.850***	35.098
		[0.228]				[0.199]	[0.080]				[0.199]	[0.102]				[0.164]	[0.074]	[0.065]	[0.258]			
	Brazil	1.242***	0.193	877.580***	43.007**	1.137***	0.260***	0.323	679.287***	45.161**	1.184***	0.365***	0.212	776.965***	40.587**	1.035***	0.292***	0.564***	>0.000	0.368	480.455***	41.300**
		[0.222]				[0.197]	[0.038]				[0.220]	[0.140]				[0.194]	[0.041]	[0.148]	[0.210]			
	Mexico	1.195***	0.245	333.586***	40.091**	0.866***	0.447***	0.546	19.536***	43.850**	1.150***	0.285***	0.262	278.370***	38.072*	0.709***	0.516***	0.657***	<0.000	0.632	10.930***	39.059**
		[0.107]				[0.095]	[0.049]				[0.107]	[0.091]				[0.090]	[0.038]	[0.076]	[0.053]			
	Argentina	0.875***	0.111	314.498***	32.037	0.504***	0.585***	0.478	205.360***	33.134	0.798***	0.479***	0.152	228.353***	32.650	0.396***	0.610***	0.615***	>0.000	0.547	174.813***	34.345
		[0.123]				[0.114]	[0.062]				[0.127]	[0.126]				[0.112]	[0.054]	[0.090]	[0.130]			
Lat. America	Chile	0.582***	0.133	93.339***	47.624***	0.580***	0.097**	0.150	108.848***	49.134***	0.557***	0.154**	0.143	88.308***	46.609***	0.529***	0.147***	0.270***	<0.000	0.180	110.127***	49.599***
		[0.065]				[0.065]	[0.040]				[0.065]	[0.066]				[0.065]	[0.049]	[0.073]	[0.072]			
	Colombia	0.218**	0.011	253.088***	48.312***	0.405***	0.768***	0.339	396.576***	65.221***	>0.000	0.587***	0.125	187.705***	50.582***	0.321***	0.718***	0.466***	>0.000	0.407	1224.268***	68.544***
		[0.091]				[0.084]	[0.084]				[0.082]	[0.120]				[0.072]	[0.072]	[0.099]	[0.141]			
	Peru	0.338***	0.029	154.822***	36.678*	0.369***	0.327***	0.111	95.872***	32.824	0.265***	0.459***	0.100	113.891***	35.739*	0.291***	0.429***	0.592***	>0.000	0.231	70.669***	30.445
		[0.090]				[0.090]	[0.074]				[0.083]	[0.090]				[0.081]	[0.073]	[0.100]	[0.079]			

Regression results in Table 6.3 show that across three model specifications, in general, almost all markets have significant exposures to world market portfolio with only two exceptions—Pakistan (in Models I and II) and Colombia (in Model II). The estimation results for Model I show that all 20 emerging markets have significant exposures to their respective country factor. Measured by betas of each factor, six of them, i.e., China, Indonesia, Malaysia, Pakistan, Argentina, and Colombia, are more sensitive to the country factor than to the world market portfolio. This evidence suggests that these emerging markets are relatively segmented from world capital market due to the dominance of the country factor in those markets during the sample period.

When the ICAPM is augmented by the regional factor (Model II), regression results under "Regional Effect" show that almost all 20 emerging markets have significant exposures to the regional factor with expected positive signs. There are two exceptions: Indonesia with zero coefficient and the Philippines with a marginally significant coefficient at 10 percent level. This result is quite surprising at first sight in that those two markets, especially Indonesia, are badly hit by the Asian Financial Crisis of 1997-1998 due to the contagion effect at the regional level. One of the possibilities is that Indonesia and the Philippines may be less regionally integrated than other Asian emerging markets during the most of the sample period. It is also a surprise to see China has the largest regional coefficient among all Asian emerging markets, about 0.840, given that China usually has a distinctive performance during the sample period. Among those markets with significant world market coefficients, Asian emerging markets, excluding India, have experienced increased exposures to world market factor relative to Model I. Three Latin American emerging markets also have increased exposures. In contrast, all five European markets have declined in their exposures to world market factor. This evidence may suggest that the regional factor plays a more important role in European emerging markets than it does in other two regions. Adjusted R^2s, however, show that only Czech Republic and Hungary have witnessed increased magnitudes relative to Model I, implying that the regional factor may be more important for these two markets than their respective country factor. Nonetheless, adjusted R^2s for other eighteen emerging markets have declined significantly, indicating that Model II may be misspecified relative to Model I.

In Model III where the ICAPM model is augmented with country, regional and industry factors, regression results in the last seven columns in Table 6.3 demonstrate that world market, country and regional factors are three important factors contributing to the shape of realized market returns of 20 emerging markets. Interestingly enough, most emerging markets have increased their exposures to country and regional factors relative to Models I and II where each factor is augmented in the ICAPM model alone. Adjusted R^2s, used as an indicator for model selection, also demonstrate that Model III is preferred to other two model specifications. In contrast, only a couple of markets have significant industry coefficients: Korea (-0.345), Malaysia (-0.738), Pakistan (0.512), and Turkey (-0.507). As can be seen, among four emerging markets with significant exposures to industry factor, three have the unexpected negative signs. This latter evidence suggests that the industry factor is still dominated by industry and country factors in explaining the variation in realized emerging market returns.

In Appendix D.1, three models are re-estimated for excess market returns above a world risk-free rate against country, regional, and industry factors that are estimated from a finely-partitioned industry classification system—39 FTSE Industry Sectors. Specified as Model I, the distribution of the emerging markets with significant exposures to the country factor is analogous to Table 6.3. Most markets have declined exposures to world market factor and increased exposures to the country factor relative to table 6.3, so do their adjusted R^2s. In contrast, when the regional factor is augmented within the ICAPM model (Model II), most Asian and Latin American emerging markets have increased exposures to world market factor relative to Table 6.3. This is less pronounced among five European markets. In the same model specification, the estimation results in Appendix D.1 show that most European and Asian markets have increased exposures to their respective regional factors while Latin American markets have reduced exposures relative to Table 6.3. Adjusted R^2s therein also suggest that this model may be misspecified relative to Model I, despite a marginal increase relative to the same model specification in Table 6.3.

The estimation results for Model III in Appendix D.1 show that world market, regional and country factors are still important in explaining the variation in the realized emerging market returns; most emerging markets have increased exposures to these three factors relative to Table 6.3. As expected, the number of markets with significant coefficients for their respective industry factors has risen from four in Table 6.3 to seven in Appendix D.1. Among them, only Malaysia has the negative exposure to its industry factor. The evidence in this appendix is consistent with the hypothesis set out by Griffin and Karolyi (1998) that finely partitioned industry classification system may better capture the role of the industry factor in each market. Adjusted R^2s also suggest that Model III, with its industry factor estimated from the refined industry classification, outperforms Models I and II as well as those in Table 6. For example, Turkey has 75.6 percent of the variation in its realized markets returns explained by this model in Appendix D.1.

Overall, the estimation results in Table 6.3 and Appendix D.1 demonstrate that during the sample period of 1994-2003, the country factor is still an important contributor to the variation in the realized emerging market returns. For some emerging markets, the regional factor may also be important, which is more pronounced in a couple of European emerging markets. Industry factor, however, is less important than the former two factors. These results are quite robust to the finely-partitioned industry classification system, though the number of emerging markets with significant exposures to the industry factor has increased. Furthermore, the importance of country and regional factors in emerging markets also reflects that emerging markets are still partially integrated with world capital market, consistent with the study by Bekaert and Harvey (1995).

In general, Table 6.3 (Appendix D.1) has confirmed that world market and country factors explain a sizable proportion of the variation in the realized emerging market returns during the period of 1994-2003. For some emerging markets, the regional factor also plays an important role but second to world market and country factors. Industry factor, on the other hand, is only marginally important in a couple of emerging markets, such as Korea, Pakistan, and Taiwan, but some of them have the unexpected negative signs. The results are quite robust to industry classification system with different level of granularity.

B. Emerging Market Volatilities

Harvey (1995) points out that the characteristic high volatility in emerging market returns can be caused by the lack of diversification in the country index, among others.[78] Therefore, as in Chapter 5, the residuals from the ICAPM model are assumed to be normally distributed and the conditional variance equation of EGARCH (1, 1) model is specified as follows:

Model I:

$$\text{EGARCH (1, 1)} + [\text{Country Factor}]_{k,\,t}\,;$$

Model II:

$$\text{EGARCH (1, 1)} + [\text{Regional Factor}]_{k,\,t}\,;\ \text{and,}$$

Model III:

$$\text{EGARCH(1,1)} + [\text{Country Factor}]_{k,\,t} + [\text{Regional Factor}]_{k,\,t} + [\text{Industry Factor}]_{k,\,t}$$

In order to save space, for each model specification, only the coefficients for each factor are reported along with their respective adjusted R^2s and BICs for model selection.

Table 6.4 and Appendix D.2 report the regression results for the above three model specifications without the consideration for the well-documented leverage effect. As in Chapter 5, the negative factor premium is translated as "bad" news. Therefore, it is expected that the coefficients for each factor augmented in the conditional variance equation of EGARCH (1, 1) model should be negatively signed because they are supposed to increase the volatility of the unexplained part of the realized market returns by the world market factor.

At first glance, adjusted R^2s in Table 6.4 suggest that only a small proportion of the variation in the realized emerging market returns are explained by the four model specifications. In general, Pakistan has negative adjusted R^2 throughout the four model specifications; meanwhile, Mexico has the highest proportion of the variation explained by the models, all above 20 percent. For a given country, there are no distinctive differences in adjusted R^2s across four model specifications.

[78] Other potential sources for the high volatility of asset returns, as identified in Harvey (1995), are: High risk exposures to volatile economic factors, time-variation in the risk exposures, and/or incomplete integration into world capital market.

Table 6.4

Impact of Value-Weighted [Cumulative] Industry (Ten FTSE Economic Groups), Country, and Regional Factors in Variance of Residuals from ICAPM Model, An EGARCH (1, 1) Model without Leverage Effect, A Sub-Sample of 20 Emerging [Stock] Markets (January 1994 – June 2003)

This table reports the estimated coefficients for each factor, i.e., a world market factor (FTSE), a country factor (CNT), a value-weighted [cumulative] industry factor (IND), and a regional factor (REGN) from the EGARCH regression model for each country. Standard errors are reported for each coefficient in square brackets, along with some model specification diagnostics. The mean equation is specified as an ICAPM model: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t}$; and the conditional variance equations are specified as three augmented EGARCH (1, 1) processes without leverage effect. They are: Model I: EGARCH(1,1) + $[\text{Country Factor}]_{k,t}$; Model II: EGARCH(1,1) + $[\text{Regional Factor}]_{k,t}$; and, Model III: EGARCH(1,1) + $[\text{Country Factor}]_{k,t}$ +$[\text{Regional Factor}]_{k,t}$ +$[\text{Industry Factor}]_{k,t}$ with the assumption that the residuals from the mean equation follow a normal distribution. An EGARCH (1,1) without the leverage effect is used as the reference model and is reported under column "Benchmark: ICAPM + EGARCH." r_k (r_{FTSE}) is the weekly excess return of country k (a world market portfolio) above a one-week Eurodollar deposit rate. Cumulative industry factors, country factors and regional factors are estimated from a two-stage dummy variable regression of Heston and Rouwenhorst (1994). That is, in the first stage, value-weighted cumulative industry factor estimated via the dummy variable regression model, in which both country and industry dummies are considered and weekly, U.S. dollar-denominated industry returns on all available FTSE Economic Group indices in all sample markets (33) are used. In a second stage, country and regional effects are estimated from the country returns, net off industry factors, via a similar dummy variable regression model, in which only regional dummies are included within a sub-sample of 20 emerging markets. Capital-weights are computed by using market capitalization at the beginning of the synthetic week (Wednesday-to-Wednesday) for each available Economic Group index within each market. Both adjusted R^2s and Schwartz Bayesian Information Criterion (BIC) is also provided along with each model to compare the effectiveness of four model specifications. Significance at the 1% level is denoted by ***, at the 5% level by **, and at the 10% level by *.

Region	Country	Benchmark: ICAPM + EGARCH			Model I: Country Factor				Model II: Regional Factor				Model III: Country Factor + Regional Factor + Industry Factor					
		FTSE	Adj. R-sq	BIC	FTSE	REGN	Adj. R-sq	BIC	FTSE	REGN	Adj. R-sq	BIC	FTSE	CNT	REGN	IND	Adj. R-sq	BIC
Asia	Korea	1.060***	0.171	-1552.9	1.046***	<0.000	0.168	-1547.2	1.049***	-1.000	0.168	-1547.3	1.044***	<0.000	<0.000	-3.465**	0.165	-1539.6
		[0.084]			[0.087]	[0.177]			[0.086]	[0.985]			[0.091]	[0.217]	[0.969]	[1.984]		
	Taiwan/China	0.696***	0.120	-1753.6	0.687***	<0.000	0.118	-1747.5	0.690***	<0.000	0.118	-1747.5	0.688***	<0.000	-1.000	>0.000	0.114	-1735.1
		[0.077]			[0.079]	[0.473]			[0.076]	[1.577]			[0.079]	[0.535]	[1.638]	[2.522]		
	China	0.262***	0.003	-1645.3	0.260***	1.000	0.001	-1640.0	0.273***	1.159*	0.001	-1639.9	0.269***	1.000	1.000	1.000	-0.003	-1628.4
		[0.080]			[0.081]	[0.657]			[0.080]	[0.864]			[0.081]	[0.715]	[0.854]	[5.236]		
	Indonesia	0.264***	0.002	-900.9	0.325***	-0.721***	0.001	-904.1	0.256***	>0.000	-0.001	-895.1	0.317***	-0.778***	1.000	-1.000	-0.005	-893.2
		[0.066]			[0.079]	[0.170]			[0.067]	[0.803]			[0.078]	[0.186]	[0.830]	[2.702]		
	Malaysia	0.344***	0.028	-1784.8	0.332***	-2.000***	0.023	-1797.6	0.338***	>0.000	0.026	-1778.5	0.328***	-2.045***	<0.000	>0.000	0.019	-1786.3
		[0.060]			[0.058]	[0.304]			[0.060]	[0.563]			[0.058]	[0.326]	[0.684]	[2.797]		
	Philippines	0.435***	0.044	-1178.6	0.457***	-0.768**	0.042	-1174.6	0.439***	<0.000	0.041	-1172.7	0.422***	-0.634*	>0.000	-8.616***	0.035	-1166.6
		[0.076]			[0.080]	[0.369]			[0.078]	[1.015]			[0.077]	[0.397]	[1.079]	[3.432]		
	Thailand	0.624***	0.070	-1274.8	0.638***	-0.550**	0.067	-1271.0	0.637***	-2.122***	0.069	-1274.4	0.656***	-0.562**	-1.952***	1.000	0.065	-1265.1
		[0.094]			[0.093]	[0.307]			[0.093]	[0.895]			[0.093]	[0.295]	[0.831]	[2.482]		
	India	0.198***	0.013	-1828.4	0.198***	0.978*	0.011	-1822.7	0.190***	-2.322**	0.011	-1827.2	0.195***	>0.000	-2.372**	5.000	0.007	-1816.0
		[0.069]			[0.066]	[0.688]			[0.071]	[1.155]			[0.069]	[0.651]	[1.236]	[5.187]		
	Pakistan	0.191**	-0.008	-1507.2	0.192**	1.000	-0.010	-1501.3	0.158*	-3.192***	-0.009	-1505.4	0.152*	<0.000	-3.385***	-3.000	-0.013	-1494.0
		[0.100]			[0.107]	[0.454]			[0.098]	[1.147]			[0.102]	[0.457]	[1.230]	[3.638]		
Europe	Czech Republic	0.568***	0.098	-1302.5	0.568***	1.000	0.096	-1297.8	0.544***	-2.045**	0.095	-1300.4	0.532***	-1.000	-2.642**	-3.000	0.088	-1290.3
		[0.079]			[0.083]	[1.041]			[0.085]	[0.988]			[0.085]	[1.218]	[1.353]	[2.570]		
	Hungary	0.793***	0.219	-1065.5	0.805***	-1.211*	0.216	-1062.7	0.765***	<0.000	0.215	-1060.3	0.787***	-1.751**	-1.970**	-8.133**	0.210	-1056.7
		[0.073]			[0.077]	[0.815]			[0.073]	[0.840]			[0.075]	[0.776]	[1.111]	[4.462]		
	Poland	0.761***	0.102	-1631.6	0.761***	<0.000	0.100	-1625.6	0.756***	<0.000	0.100	-1626.4	0.740***	>0.000	<0.000	-6.901***	0.095	-1630.2
		[0.074]			[0.074]	[0.365]			[0.075]	[0.399]			[0.069]	[0.452]	[0.383]	[1.479]		
	Russia	0.783***	0.077	-696.7	0.890***	-1.040***	0.076	-725.7	0.801***	1.726***	0.076	-700.7	0.796***	-0.831***	>0.000	-1.778**	0.069	-712.5
		[0.115]			[0.101]	[0.195]			[0.109]	[0.485]			[0.093]	[0.195]	[0.377]	[1.035]		
	Turkey	0.872***	0.056	-1086.3	0.803***	-0.978***	0.051	-1085.2	0.849***	-1.000	0.053	-1080.9	0.814***	-0.951***	<0.000	4.000	0.047	-1074.5
		[0.134]			[0.139]	[0.325]			[0.138]	[0.546]			[0.142]	[0.345]	[0.592]	[3.426]		
Lat. America	Brazil	0.946***	0.174	-1416.7	1.130***	-1.803***	0.181	-1463.4	0.978***	-2.360**	0.176	-1413.1	1.186***	-1.963***	-4.757***	3.390*	0.179	-1460.9
		[0.046]			[0.074]	[0.237]			[0.047]	[1.355]			[0.082]	[0.268]	[1.297]	[2.261]		
	Mexico	1.141***	0.237	-1731.2	1.151***	-1.953***	0.232	-1745.9	1.143***	1.503*	0.235	-1726.1	1.143***	-2.093***	-1.000	-1.000	0.228	-1734.3
		[0.065]			[0.074]	[0.288]			[0.069]	[0.976]			[0.074]	[0.338]	[0.979]	[2.018]		
	Argentina	0.907***	0.105	-1561.9	0.955***	-3.076***	0.097	-1581.8	0.924***	2.365**	0.103	-1557.8	0.951***	-3.153***	2.822**	-2.967**	0.093	-1575.6
		[0.073]			[0.085]	[0.451]			[0.081]	[1.316]			[0.087]	[0.484]	[1.325]	[1.783]		
	Chile	0.518***	0.126	-2025.6	0.516***	>0.000	0.124	-2019.5	0.505***	2.868***	0.123	-2028.0	0.513***	>0.000	2.696***	1.000	0.120	-2015.6
		[0.053]			[0.053]	[0.619]			[0.052]	[0.827]			[0.052]	[0.568]	[0.954]	[1.386]		
	Colombia	0.151**	0.003	-1771.5	0.179***	3.682***	0.000	-1773.2	0.168**	4.621***	0.002	-1771.7	0.183***	2.630**	2.199*	<0.000	-0.004	-1762.2
		[0.074]			[0.071]	[0.832]			[0.073]	[0.996]			[0.072]	[1.297]	[1.651]	[4.561]		
	Peru	0.165**	0.014	-1805.1	0.168**	-1.000	0.013	-1799.1	0.171**	>0.000	0.013	-1798.9	0.164**	-1.000	>0.000	-2.000	0.008	-1787.2
		[0.073]			[0.075]	[0.733]			[0.073]	[1.434]			[0.080]	[0.735]	[1.464]	[2.372]		

As a result, BICs are used for the purpose of model selection. Regression results in Table 6.4 show that under a broad industry classification system, all 20 emerging markets have significant and positive exposures to world market factor that is specified in the mean equation in the three EGARCH (1, 1) models. For a given market, the magnitude of the coefficients for world market factor across three models is almost identical to each other. For each national market, BICs also indicate that each model specification is almost as effective as on another. Similar results are also obtained in Appendix D.2, where the regression results under a finely-partitioned industry classification system are presented.

In Model I, the estimation results in Table 6.4 show that twelve emerging markets have significant coefficients for their respective country factors; two of them, i.e., India and Colombia, however, have positive coefficients for their respective country factors. Measured in absolute values, Colombia has the largest coefficient of 3.682, while Thailand, the least, about 0.550. In Model II where the regional factor is augmented within the conditional variance equation, the regression results show that there are ten markets have significant coefficients for their respective regional factors. Among them, five markets have the unexpected positive coefficients; most of them (four out of the five markets) are concentrated in Latin America. For example, gauged in absolute values, Colombia has the largest positive exposure to regional factor, about 4.621. When specified as Model III where three factors are consider together, estimation results in Table 6.4 show that the distribution of the emerging markets with significant coefficients for their respective country and regional factors is almost identical to the factors have the expected negative signs, with the exception of a couple of Latin American markets that have positive exposures to regional factor. As regards industry factor, seven markets have significant coefficients for industry factor; six of them have the expected negative signs. In total, three emerging markets, i.e., Hungary, Brazil, and Argentina, have significant exposures to all three factors. Among them, Hungary is more sensitive to the industry factor than country and regional factors. BICs, however, suggest that Model III is less an idea model than Models I and II, implying that the industry factor is only a marginal contributor to the variation in the emerging market volatilities during the period of 1994-2003.

Are the above results robust to a refined version of industry classification system? Appendix D.2 provides the similar regression results as Table 6.4 but under 39 refined

FTSE Industry Sectors. The estimation results in Appendix D.2 exhibit that when the country or regional factor is augmented into the conditional variance equation of the EGARCH (1, 1) model alone, analogous to Table 6.4, most emerging markets have more significant exposures to their respective country factors than their regional counterparts. Several markets, such as Pakistan and Colombia, still have the embarrassing positive coefficients for their respective country or regional factors. As expected, the number of emerging markets with significant exposures to the industry factor has also increased from seven in Table 6.4 to 12 in Appendix D.2 and only three out of the 12 markets have the unexpected positive coefficients. Most of them have experienced increased exposures to the industry factor relative to Table 6.4. For example, gauged in absolute values, the coefficient for the industry factor in China has increased from 1.000 (insignificant) in Table 6.4 to 7.249 in Appendix D.2.

In general, the estimation results in Table 6.4 and Appendix D.2 suggest that country and regional factors are important in explaining the variation in country-specific volatilities, defined as the residuals from the ICAPM. Notably, when specified as Model II, most emerging markets have puzzling positive signs for the coefficients for their respective regional factors. On the other hand, the industry factor is only marginally important in a couple of emerging markets in capturing the variation in the country-specific volatilities. For some emerging markets, such as Pakistan, they are more sensitive to industry and regional factors than country factors. However, BICs unanimously suggest that Model III in which three factors are considered together is less an idea model relative to Models I and II in most emerging markets. Provided that BICs tend to select parsimonious model, the evidence in Table 6.4 and Appendix D.2 suggest that the country factor is sufficient enough to capture most of the variation in realized emerging market volatilities during the sample period.

Is the puzzle of the unexpected positive signs for the industry, country and regional factors in some emerging markets due to the interactive role between each factor and the well-documented leverage effect that is not explicitly considered in Table 6.4 and Appendix D.2? Fortunately, The EGARCH (1, 1) model also admits the examination of the well-documented leverage effect in association with industry, country and regional factors. Table 6.5 and Appendix D.3 present the estimation results for the model specifications analogous to Table 6.4 an Appendix D.2, but with the explicit consideration for the leverage effect in each market.

Table 6.5

Impact of Value-Weighted [Cumulative] Industry (Ten FTSE Economic Groups), Country, and Regional Factors in Variance of Residuals from ICAPM Model, An EGARCH (1, 1) Model with Leverage Effect, A Sub-Sample of 20 Emerging [Stock] Markets (January 1994 – June 2003)

This table reports the estimated coefficients for each factor, i.e., a world market factor (FTSE), a country factor (CNT), a value-weighted [cumulative] industry factor (IND), and a regional factor (REGN) from the EGARCH regression model for each country. Standard errors are reported for each coefficient in square brackets, along with some model specification diagnostics. The mean equation is specified as an ICAPM model: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t}$; and the conditional variance equations are specified as three augmented EGARCH (1, 1) processes with leverage effect. They are: Model I: EGARCH(1,1) + [Country Factor]$_{k,t}$; Model II: EGARCH(1,1) + [Regional Factor]$_{k,t}$; and, Model III: EGARCH(1,1) + [Country Factor]$_{k,t}$ +[Regional Factor]$_{k,t}$ +[Industry Factor]$_{k,t}$ with the assumption that the residuals from the mean equation follow a normal distribution. An EGARCH (1, 1) with the leverage effect is used as the reference model and is reported under column "Benchmark: ICAPM + EGARCH + LEV." r_k (r_{FTSE}) is the weekly excess return of country *k* (a world market portfolio) above a one-week Eurodollar deposit rate. Cumulative industry factors, country factors and regional factors are estimated from a two-stage dummy variable regression of Heston and Rouwenhorst (1994). That is, in the first stage, value-weighted cumulative industry factors estimated via the dummy variable regression model, in which both country and industry dummies are considered and weekly, U.S. dollar-denominated industry returns on all available FTSE Economic Group indices in all sample markets (33) are used. In a second stage, country and regional factors are estimated from the country returns, net off industry factors, via a similar dummy variable regression model, in which only regional dummies are included within a sub-sample of 20 emerging markets. Capital-weights are computed by using market capitalization at the beginning of the synthetic week (Wednesday-to-Wednesday) for each available Economic Group index within each market. . Both adjusted R^2s and Schwartz Bayesian Information Criterion (BIC) is also provided along with each model to compare the effectiveness of four model specifications. Significance at the 1% level is denoted by ***, at the 5% level by **, and at the 10% level by *.

Region	Country	Benchmark: ICAPM + EGARCH + LEV				Model I: Country Factor					Model II: Regional Factor					Model III: Country Factor + Regional Factor + Industry Factor						
		FTSE	LEV	Adj. R-sq	BIC	FTSE	LEV	CNT	Adj. R-sq	BIC	FTSE	LEV	REGN	Adj. R-sq	BIC	FTSE	LEV	CNT	REGN	IND	Adj. R-sq	BIC
Asia	Korea	1.037***	-0.469***	0.166	-1557.3	1.030***	-0.452***	>0.000	0.164	-1550.9	1.026***	-0.482**	>0.000	0.164	-1550.9	1.027***	-0.723**	>0.000	1.000	-3.614***	0.159	-1546.8
		[0.089]	[0.180]			[0.090]	[0.185]	[0.207]			[0.090]	[0.224]	[1.012]			[0.092]	[0.340]	[0.248]	[0.999]	[1.437]		
	Taiwan/China	0.672***	-0.307**	0.117	-1749.9	0.681***	-0.421**	<0.000	0.116	-1743.4	0.669***	-0.336**	>0.000	0.116	-1743.9	0.686***	-0.546*	<0.000	1.000	1.000	0.112	-1731.9
		[0.078]	[0.183]			[0.081]	[0.250]	[0.482]			[0.079]	[0.198]	[1.456]			[0.081]	[0.337]	[0.496]	[1.279]	[1.821]		
	China	0.259***	<0.000	0.001	-1639.6	0.261***	-0.122*	1.247**	-0.001	-1635.4	0.276***	<0.000	1.454*	-0.001	-1634.8	0.281***	-0.154**	1.448**	1.638**	2.000	-0.006	-1624.7
		[0.080]	[0.071]			[0.079]	[0.079]	[0.713]			[0.079]	[0.079]	[0.962]			[0.075]	[0.086]	[0.789]	[0.971]	[5.259]		
	Indonesia	0.294***	-0.245**	0.002	-898.2	0.329***	>0.000	-0.758***	-0.002	-898.2	0.290***	-0.279**	1.000	-0.001	-892.9	0.315***	>0.000	-0.794***	1.000	-1.000	-0.008	-887.4
		[0.074]	[0.124]			[0.081]	[0.163]	[0.267]			[0.074]	[0.153]	[0.860]			[0.081]	[0.175]	[0.279]	[0.844]	[2.714]		
	Malaysia	0.312***	-0.727***	0.028	-1815.2	0.312***	-0.642***	-0.781***	0.025	-1812.5	0.316***	-0.816***	1.217**	0.026	-1811.1	0.302***	-1.000***	-0.599**	0.929**	-6.718**	0.021	-1803.9
		[0.061]	[0.148]			[0.062]	[0.148]	[0.319]			[0.061]	[0.176]	[0.621]			[0.061]	[0.354]	[0.320]	[0.563]	[2.960]		
	Philippines	0.438***	-0.332***	0.042	-1179.3	0.449***	-0.295***	<0.000	0.039	-1173.8	0.438***	-0.329***	<0.000	0.039	-1173.5	0.364***	-0.503***	>0.000	<0.000	-12.095***	0.030	-1170.4
		[0.078]	[0.116]			[0.079]	[0.124]	[0.394]			[0.079]	[0.116]	[0.936]			[0.069]	[0.163]	[0.408]	[0.920]	[2.863]		
	Thailand	0.637***	-0.456**	0.071	-1277.0	0.635***	-0.493**	>0.000	0.069	-1270.8	0.640***	-0.412**	-1.758**	0.069	-1275.7	0.639***	-0.444**	>0.000	-1.757**	-1.000	0.065	-1263.4
		[0.083]	[0.235]			[0.084]	[0.257]	[0.391]			[0.084]	[0.205]	[0.795]			[0.086]	[0.248]	[0.404]	[0.835]	[2.863]		
	India	0.214***	-0.443***	0.011	-1829.1	0.201***	-0.427***	1.051*	0.008	-1824.0	0.206***	-0.376**	-1.868**	0.009	-1826.2	0.199***	-0.415**	1.000	-1.741*	4.000	0.005	-1815.3
		[0.069]	[0.184]			[0.068]	[0.181]	[0.707]			[0.070]	[0.180]	[1.132]			[0.068]	[0.190]	[0.706]	[1.201]	[4.886]		
	Pakistan	0.187**	-0.170*	-0.010	-1502.4	0.173*	-0.213**	0.972**	-0.013	-1497.7	0.151*	<0.000	-3.042***	-0.011	-1499.7	0.146*	-0.159*	>0.000	-2.338**	-4.000	-0.015	-1488.9
		[0.103]	[0.114]			[0.109]	[0.109]	[0.473]			[0.101]	[0.097]	[1.177]			[0.106]	[0.119]	[0.496]	[1.300]	[3.408]		
Europe	Czech Republic	0.577***	-1.000	0.095	-1298.0	0.566***	-1.000	1.000	0.093	-1292.7	0.530***	-1.000	-2.432**	0.091	-1296.8	0.534***	-1.000	-1.000	-2.438**	-3.462*	0.086	-1286.8
		[0.081]	[3.667]			[0.082]	[4.460]	[0.824]			[0.084]	[2.528]	[1.055]			[0.084]	[2.079]	[1.201]	[1.382]	[2.418]		
	Hungary	0.782***	-1.000	0.216	-1067.5	0.789***	-1.000	-1.000	0.213	-1063.0	0.792***	-1.000	1.000	0.214	-1062.1	0.783***	-1.000	-1.000	<0.000	-7.280*	0.208	-1055.4
		[0.075]	[0.805]			[0.077]	[0.902]	[0.735]			[0.077]	[0.906]	[1.009]			[0.074]	[1.302]	[0.909]	[1.295]	[4.518]		
	Poland	0.762***	-0.444***	0.101	-1631.5	0.766***	-0.481**	>0.000	0.099	-1625.1	0.766***	-0.474***	>0.000	0.099	-1625.3	0.737***	-0.707**	>0.000	>0.000	-6.788***	0.095	-1627.3
		[0.073]	[0.171]			[0.072]	[0.206]	[0.356]			[0.072]	[0.177]	[0.414]			[0.065]	[0.398]	[0.418]	[0.484]	[1.560]		
	Russia	0.827***	-1.000	0.079	-701.4	0.946***	<0.000	-0.940***	0.078	-717.6	0.922***	-1.000	0.696**	0.082	-700.4	0.793***	1.000	-1.112***	>0.000	-2.055*	0.063	-698.1
		[0.117]	[0.949]			[0.094]	[0.961]	[0.231]			[0.116]	[1.088]	[0.381]			[0.086]	[1.751]	[0.380]	[0.605]	[1.393]		
	Turkey	0.849***	>0.000	0.053	-1080.3	0.810***	0.306**	-1.409***	0.045	-1081.5	0.836***	>0.000	-0.759*	0.051	-1075.5	0.814***	0.558**	-1.529***	-1.047*	4.503*	0.037	-1073.1
		[0.136]	[0.143]			[0.140]	[0.173]	[0.369]			[0.141]	[0.164]	[0.569]			[0.149]	[0.294]	[0.426]	[0.639]	[3.355]		
Lat. America	Brazil	1.004***	-0.917***	0.179	-1436.1	1.141***	-0.485***	-1.477***	0.182	-1466.3	1.013***	-0.875***	-1.000	0.178	-1430.6	1.172***	-0.354**	-1.704***	-3.543***	1.000	0.179	-1459.9
		[0.051]	[0.245]			[0.075]	[0.183]	[0.221]			[0.054]	[0.241]	[1.286]			[0.081]	[0.174]	[0.258]	[1.345]	[2.416]		
	Mexico	1.056***	-1.000***	0.235	-1755.3	1.081***	-0.957***	-1.060***	0.233	-1755.7	1.058***	-1.000***	1.392*	0.233	-1750.2	1.067***	-1.000***	-0.939**	1.000	-2.990*	0.230	-1745.5
		[0.063]	[0.333]			[0.067]	[0.309]	[0.329]			[0.064]	[0.334]	[0.955]			[0.069]	[0.404]	[0.405]	[1.020]	[1.831]		
	Argentina	0.906***	-0.229***	0.103	-1558.6	0.957***	>0.000	-3.064***	0.094	-1575.6	0.952***	-0.482***	3.673***	0.101	-1558.7	0.945***	<0.000	-2.837***	2.971**	-2.984**	0.094	-1570.0
		[0.081]	[0.084]			[0.088]	[0.102]	[0.450]			[0.090]	[0.137]	[1.226]			[0.088]	[0.116]	[0.481]	[1.342]	[1.686]		
	Chile	0.503***	-0.310***	0.123	-2025.2	0.501***	-0.325***	>0.000	0.121	-2018.7	0.525***	-0.746**	4.067***	0.122	-2035.0	0.521***	-0.792**	>0.000	4.670***	-2.000	0.117	-2022.6
		[0.055]	[0.117]			[0.055]	[0.111]	[0.677]			[0.048]	[0.357]	[0.819]			[0.051]	[0.409]	[0.524]	[1.045]	[1.507]		
	Colombia	0.161**	-0.190**	0.002	-1767.3	0.195***	-0.233***	3.864***	-0.003	-1770.2	0.133*	-1.000***	3.167***	-0.001	-1767.9	0.148**	-1.000***	1.601**	1.830**	-3.471**	-0.006	-1755.8
		[0.076]	[0.098]			[0.072]	[0.100]	[0.880]			[0.082]	[0.366]	[0.917]			[0.077]	[0.374]	[0.813]	[0.998]	[1.739]		
	Peru	0.173***	-0.436**	0.014	-1805.8	0.174***	-0.425**	<0.000	0.012	-1799.6	0.189***	-0.516***	2.000	0.013	-1800.7	0.172**	-0.517**	>0.000	2.254*	-2.000	0.007	-1789.0
		[0.072]	[0.195]			[0.074]	[0.194]	[0.704]			[0.075]	[0.207]	[1.573]			[0.076]	[0.230]	[0.746]	[1.596]	[1.670]		

Analogous to the adjusted R^2s reported in Table 6.4, adjusted R^2s in Table 6.5 also indicate that the four model specifications are less effective in capturing the variation in the realized emerging market returns. However, the estimation results in Table 6.5 show that all 20 emerging markets have significant and positive coefficients for the world market factor across four model specifications. On the other hand, not all emerging markets have significant coefficients for their respective leverage effects; it is less prominent among European emerging markets than their counterparts in other two regions. When the estimated coefficients for each factor are measured in their absolute values, the estimation results for Model I in Table 6.5 reveal that most emerging markets have experienced the increased exposures to their respective country factors relative to Table 6.4. In Model II where the regional factor is considered, most emerging markets, however, have reduced exposures to their respective regional factors relative to Table 6.4. Unfortunately, the signs for the estimated country and regional factors do not vary so much from Table 6.4. Emerging markets like Pakistan and Colombia still have positive exposures to their respective country and regional factors, after the control for the leverage effect. Specified as Model III, in general, the distribution of emerging markets with significant coefficients for country and regional factors is almost identical to that of Models I and II where each factor is considered alone with the leverage effect therein. Two Asian emerging markets, i.e., India and Pakistan, have lost their significance in the coefficients for their respective country factors. Meanwhile, analogous to Table 6.4, three Latin American emerging markets, i.e., Argentina, Chile, and Colombia, still have significant and positive exposures to Lain American regional factor. Regarding industry factor, the number of markets with significant coefficients for their respective industry factors has increased relative to Table 6.4; most of them have the expected negative coefficients. In total, four emerging markets, i.e., Malaysia, Turkey, Argentina, and Colombia, have significant exposures to all three factors; measured in absolute values, three out of the four markets are more sensitive to the industry factor than their respective country or regional factors. Analogous to Table 6.4, BICs show that the augmentation of three factors into the conditional variance equation of the EGARCH (1, 1) model does not increase the attractiveness of Model III relative to Models I and II. The estimation results in Table 6.5 may suggest that after the control for the well-documented leverage effect, the country factor is still an important contributor to the variation in the realized emerging market returns relative to industry and regional factors for the 20 emerging markets surveyed in this chapter, though weak evidence suggests that the industry factor may also be an important contributor in some emerging markets.

The sensitivity tests have also been done under the refined 39 FTSE Industry Sectors classification system. The estimation results in Appendix D.3 largely support the empirical findings in Table 6.5, though some emerging markets with marginally significant coefficients for their respective country and regional factors in Table 6.4 have lost their significance in Appendix D.3. As expected, in Model III, the number of emerging markets with significant and negative exposures to their respective industry factors has increased relative Table 6.5, so are the absolute magnitudes for the coefficients for the industry factor in those markets.

The empirical findings in Table 6.5 and Appendix D.3 indicate that country, regional and industry factors may be instrumental in identifying the possible sources of the variation in the residuals of the ICAPM model, a proxy for the unsystematic risk, after the explicit control for the well-known leverage effect. BICs, a proxy for model selection, suggest that Model I is preferred to other two models, indicating that the country factor is the most important contributor among the three factors. However, puzzles still exist. For some emerging markets, they have significant but positively signed coefficients for the three factors. This is more phenomenal in a couple of European and Latin American emerging markets than their Asian counterparts. Weak evidence, however, is also provided in the regression results for Model III that the industry factor may be also important source for the variation in the realized emerging market volatilities but with a less defined role than its country and regional counterparts, after accounting for the leverage effect.

As a conclusion, the estimation results in this section suggest that the country factor is important in determining the variation in the residuals from the ICAPM model that cannot be explained by world market factor alone. Regional factor, however, plays a less defined role than the country factor for the puzzling positive signs associated with the coefficients for those emerging markets with significant exposures to their respective regional factors. The explicit control for the well-documented leverage effect, as in Table 6.5 and Appendix D.3, does not solve the puzzles. Industry factor, on the other hand, is important only for a couple of emerging markets. This is more pronounced in the case where a finely-partitioned industry classification system is used or the well-documented leverage effect is under control. This evidence is consistent with the study by Griffin and Karolyi (1998) that the industry factor is strong in a finely partitioned industry classification system due to the possible masking effect within the aggregate industry classification system in which the performances of the constituent stocks in each industry are less homogenous. However, adjusted R^2s reported in the tables of this section suggest that the EGARCH models may be misspecified relative to the ICAPM models in the previous section. As a result, the conclusions may be less effective than should be.

6.4 Time-varying Analysis

Analogous to Chapter 5, this section will examine the estimated industry, country and regional factors within a dynamic framework. Each factor is considered in their aggregate form via two cross-sectional weighting schemes: equally- versus value-weighted. Then means and standard deviations are computed from these aggregate factors within a rolling window of 36 weeks. [79] Given the presence of outlier observations during the sample period, two rolling robust measures—median and MAD with its population centre defined as the median—are also computed in a hope to neutralize the impact from outliers. In each plot, the U.S. business cycles, a proxy for global business cycles and identified by National Bureau of Economic Research (NBER), are also provided to investigate the performance of each factor in the context of the different global business conditions.

Before the commencement of the analysis, the time-series plot for the regional weights is presented in Figure 6.1. This plot is used to brief the importance of each region's contribution to the world emerging market portfolio in terms of their market capitalizations. Figure 6.1 illustrates that Asia and Latin America dominate the emerging market sample in terms of their U.S. dollar-denominated market capitalizations, which are well above the market capitalization of Europe throughout the sample period. What is interesting is that the regional weight of Latin America has experienced a significant drop during the late half of the sample period. As the timeline

[79] Same statistics within rolling windows of 12 and 52 weeks are also computed. Major results are largely the same as the statistics computed within the rolling window of 36 weeks.

suggests, the turning point is around late-1997 or early-1998.

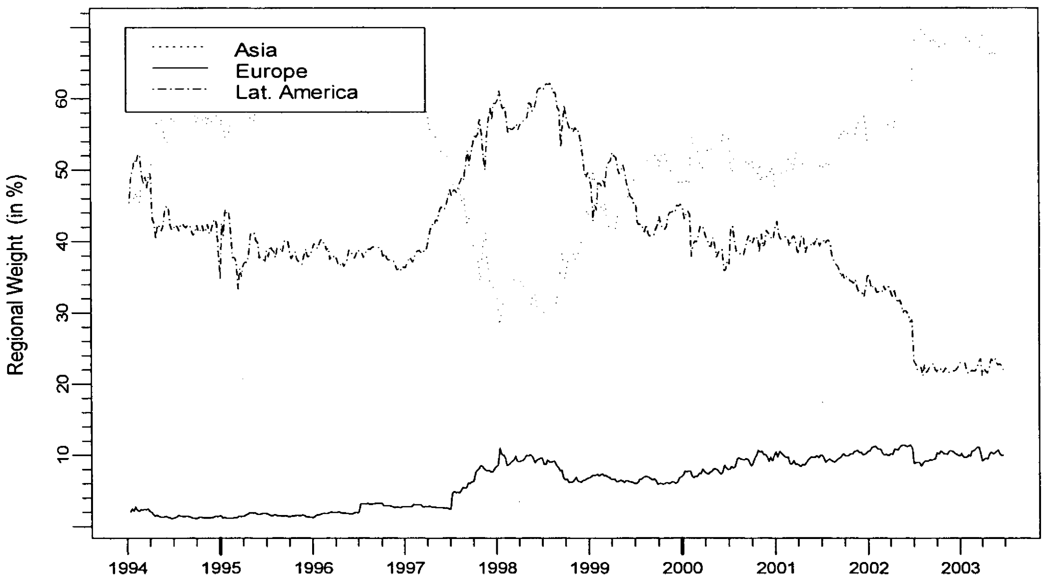


Figure 6.1. Time series plot of weekly regional weights.
The weekly weights for each region are calculated using the market capitalizations for its constituent countries at the beginning of week.

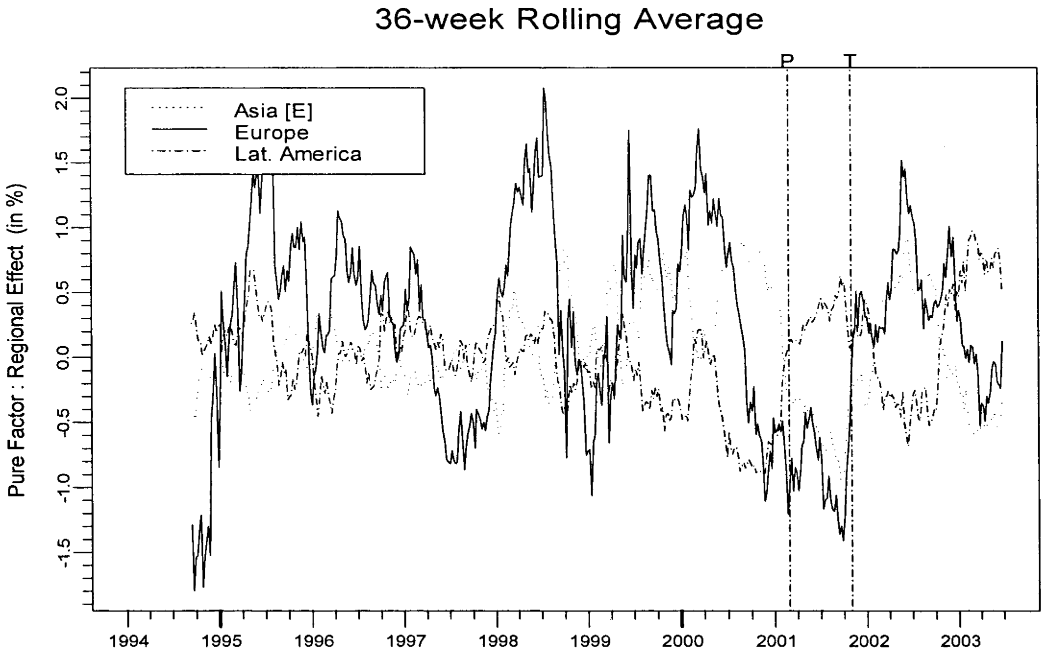
There could be two possibilities for this drop. The first possibility is that the FTSE All-World Index Series$^{TM/SM}$ has intentionally down-weighted the Latin American stocks because of the change of the appetite of its customers who have switched from Latin American emerging markets to those located in Asia and Europe with superior national market performances. The other possibility is that the financial crises that took place in Latin America during the later sample period have significantly depreciated their home currencies relative to the U.S. dollars, which leads to a significant drop in the U.S. dollar-denominated market capitalizations of its constituent national markets. The second possibility is more plausible. As Figure 6.1 shows, during the Asian Financial Crisis of 1997-1998, Asia has also experienced a significant drop in its weight computed from the U.S. dollar-denominated market capitalizations of its constituent national stock markets relative to Latin America, with the latter achieving the highest cross-sectional weight throughout the full sample period. Unlike Asia and Latin America, Europe, however, has witnessed a steady growth in its regional weight, from approximately 3 percent in early 1994 to 10 percent in mid 2003. This rise in the regional weight may suggest that European emerging markets have become increasingly mature and open to the world capital market in the past ten years. As a result, international investors are more interested in stocks listed in this region than used to be, which leads FTSE All-World Index Series$^{TM/SM}$ to increase the number of sample stocks available in European emerging markets with a hope that it can provide a good proxy for the country/industry performance in these markets. This is also confirmed in the time series plots of the number of equities in European emerging markets (see Appendix B.6). Markets like Poland and Turkey have their number of equities increased during the middle of the sample period, but with significant drops since mid-1998.

The time series plot of regional weights in Figure 6.1 only provides a partial picture on the importance of the regional factor to the emerging market performances. In what follows, a comprehensive analysis based upon time-series plots of rolling averages and standard deviations, as well as the rolling medians and MADs, will be provided for three estimated regional factors from the extended dummy variable regression model. Section 6.3.2 and Section 6.3.3, on the other hand, will provide time-series plots for the aggregate country, regional and industry factors via equally- and capital-weighting schemes, respectively.

6.4.1 Time Series Behavior of Regional Factors

Figure 6.2 has provided the time-series plots of rolling averages and standard deviations of three regional factors estimated from the extended dummy variable regression model within a rolling window of 36 weeks. Meanwhile Figure 6.3 has provided the rolling medians and MADs within the same size of the rolling window.

At first glance, the rolling average plot in the top panel of Figure 6.2 suggests that during the sample period, Europe appears to be more volatile than other two regions. This evidence is further confirmed by the time-series plot for its rolling standard deviations in the bottom panel.



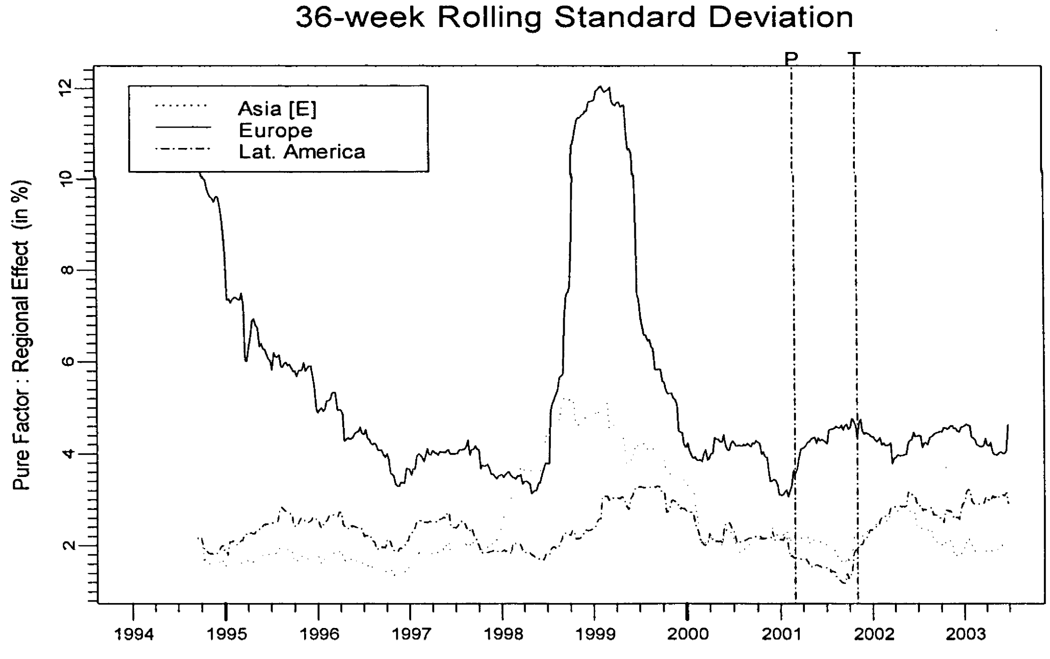


Figure 6.2. 36-week rolling averages and standard deviations of regional factors estimated from industry returns on ten FTSE Economic Groups available in 20 emerging markets during the period 1994 – 2003.

In these plots, industry, country, and regional factors are aggregated as the cross-sectional averages of absolute values of the factor loadings for 10 FTSE Economic Groups, 20 emerging markets, and 3 regions. Within each rolling window, means and standard deviations are computed for each aggregate factor. The pure country returns used in the second stage are estimated from industry returns on ten FTSE Economic Groups. "P" and "T" denote the peak and trough dates of the U.S. business cycles as identified by National Bureau of Economic Research during 1994 - 2003.

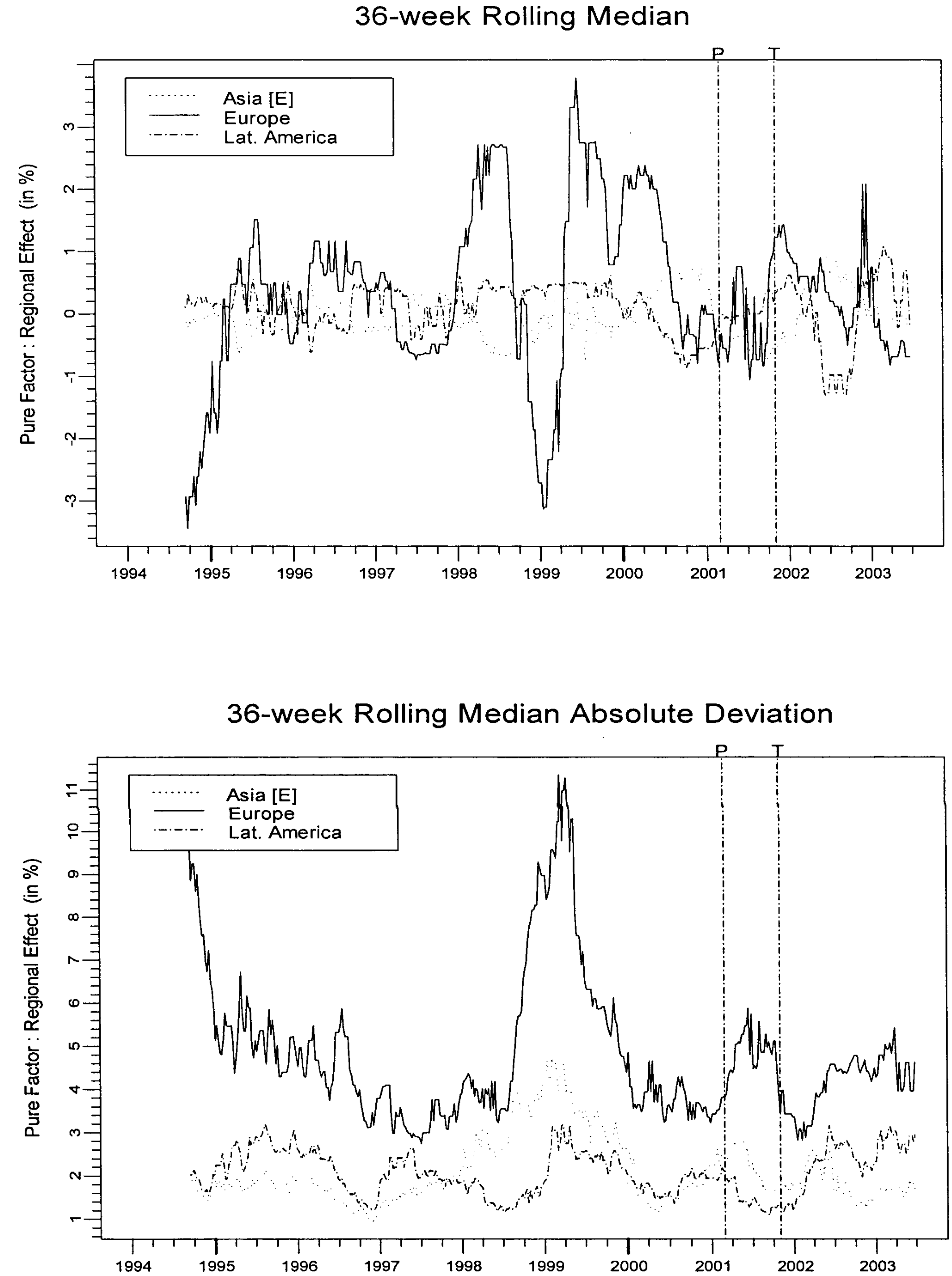


Figure 6.3. 36-week rolling medians and MADs of regional factors estimated from industry returns on ten FTSE Economic Groups available in 20 emerging markets during the period 1994 – 2003.
In these plots, industry, country, and regional factors are aggregated as the cross-sectional averages of absolute values of the estimated factor loadings for 10 FTSE Economic Groups, 20 emerging markets, and 3 regions. Within each rolling window, medians and MADs (center is defined as median) are computed for each aggregate factor. "P" and "T" denote the peak and trough dates of the U.S. business cycles as identified by National Bureau of Economic Research during 1994 – 2003.

Meanwhile, the regional premia for Asia and Latin America are mingled with each other in the early period. However, immediately after the Asian Financial Crisis, there appears to be a significant discrepancy in their regional performances, with Asia exhibiting negative regional premium and Latin America the positive one. Since 1998, this situation has reversed, with Asia possessing positive regional premium and Latin America the negative regional premium. This evidence may suggest that Asian countries have recovered the trauma of regional financial crisis much quickly than expected. Meanwhile, Latin American and some of European countries that had caught the Asian flu, however recovered relatively slow when compared to their Asian counterparts.

During the recent years, especially during 2001 (or as indicated by the business cycles, the recession period from peak to the following trough) that hosts 9/11 Terrorists Attack in the U.S., it is a surprise to see that Latin America has outperformed Asia and Europe. Since 2002, the trend reverses itself again: Asia and Europe has gained its footing against Latin America during the economic recovery of the global economy led by the U.S., so is the volatility of each regional factor. This result may suggest that the economies in Latin America are less integrated with the developed countries than those economies in Asia and Europe are.

Moreover, Figure 6.2 exhibits that the regional premium for Asia is more sensitive to the global business cycles than other two regions. At the same time, regional financial crises also have significant impact on its regional performance. This is also true for Latin America, with the significant drops of its regional premium relative to the other two regions during the later half of the sample period when it suffered a chain of the regional financial crises. Further, Asia and Latin America perform in a more heterogeneous way during recent years than they did in the early period, suggesting that the regional fundamentals that formulated the regional market performances may be different from each other during recent years. Therefore, when investing in these two regions, the regional factor should be considered along with other factors as well. Otherwise, significant loss may incur with a heavy bet in Latin American emerging markets. On the other hand, Europe seems to have its own unique story. Its pattern is less pronounced than the case in Asia and Latin America, especially during the early sample period. During recent years, however, its regional premium seems to follow the U.S. business cycles closely as Asia does, with negative regional premium during the recession periods and positive premium during the recovery periods. The plot of standard deviations in the bottom panel of Figure 6.2 is consistent with the above analysis. One of the interesting features of this plot is that Europe is more responsive to the volatility of Asia than the volatility of Latin America. This may reflect the importance of geographical proximity in evaluating the performance of emerging markets by international investors.

The mean and standard deviation measures are sensitive to outlier observations, especially within a window as short as 36 weeks. In an attempt to mitigate the influence of outliers, Figure 6.3 also provides two plots for the robust measures—medians and MADs. The top panel of Figure 6.3 shows that Europe has exhibited the similar pattern as the case in Figure 6.2, but with more extreme regional performance. The plot for the regional premia of Asia and Latin America, however, has generated a much clearer picture on the distinctive behaviors of two regions: During the Asian Crisis period, Latin America outperforms Asia; the situation has reversed when Latin America has experienced its regional crises during late sample period. Business cycles also have exerted significant impact on the regional performances of Asia and Latin America, with positive regional premia during recovery period and negative ones during recession period, but at the mercy of their regional crises. Consistent with the time series plot for the rolling standard deviations of the regional factor, the plot of rolling MADs show that Asia always leads Europe in the increase of the regional volatility, for example, during 1997-1998 and during later-2000.

Furthermore, two volatility measures in Figures 6.2 and 6.3, i.e., standard deviations and MADs, have shown a clear picture of the transmission of volatility across regions. That is, the Asian Financial Crisis leads the following crises in Europe and Latin America, which culminate in debt crisis of Russia in 1998.

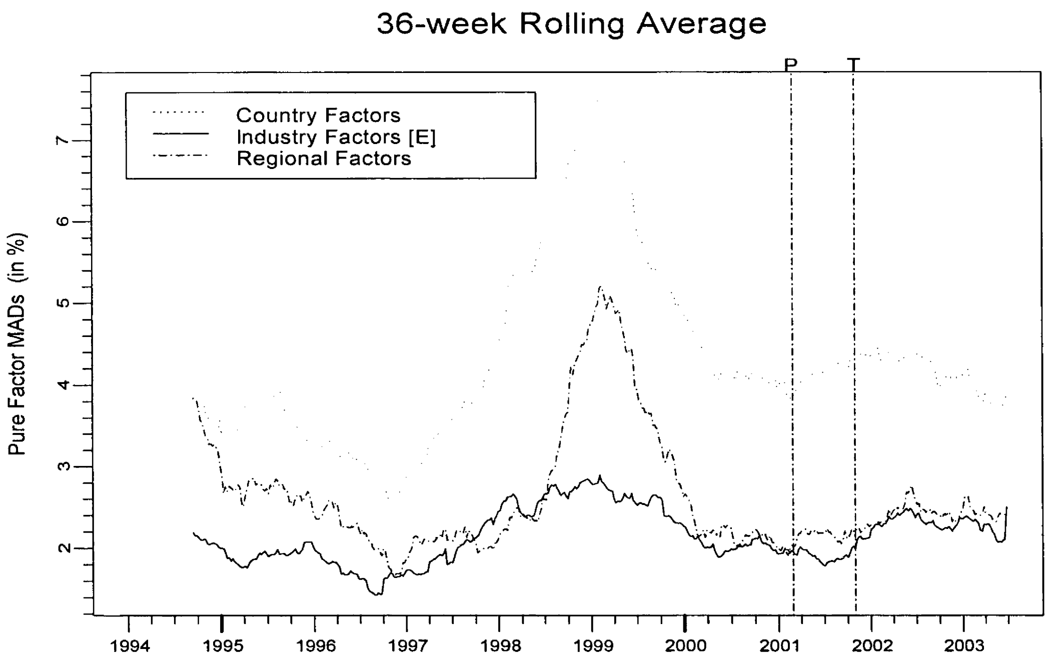
The above empirical findings are also robust to a refined industry classification system as in Appendices D.1 and D.2.

6.4.2 Equally-Weighted Aggregate Industry, Country and Regional Factors

In the context of emerging markets, the changing integration of these markets with world capital markets has a significant impact on the relative importance of different pricing factors as well as the market risk premium. A conditional analysis would be a preferable procedure in this case. Thus, the analysis will be implemented with a focus on the dynamic feature of each factor. This section provides time-series plots for country, regional and industry factors, measured in their aggregate forms via equally-weighting the absolute values of the estimated factor premia for their constituent countries, regions and industries. Notice that the industry factor is estimated from a sample comprising all 33 countries to ensure its global nature.

Figure 6.4 provides time-series plots for means and standard deviations of each factor within a rolling window of 36 weeks under the broad industry classification (ten FTSE Economic Groups). Top panel of Figure 6.4 shows that the country factor dominates other two factors in terms of its contribution to the average emerging market returns during the period of 1994-2003. The regional factor is as important as the country factor in the very beginning of the sample period; however, it concedes its importance to the country factor during late sample period, although there is a significant increase in its magnitude during the mid-1999. Afterwards, the industry factor intermingles with the regional factor, especially since 2000. This evidence shows that the industry factor is as important as the regional factor in determining average market returns during the recent years.

There is a significant increase in the regional factor during 1998-1999. It is not surprising to see that because during that period, most emerging markets in three regions were either directly hit by the Asian Financial Crisis of 1997-1998 or indirectly affected by its ripple effects. It is also quite interesting to see that the country factor actually leads the increase in the magnitude of the regional factor, suggestive of the worsening economic fundamentals in the countries of a region leading to the increase in the regional risk. When the industry factor is examined in association with the global business cycles, the top panel of Figure 6.4 shows that during the recovery period (from the pervious trough to this peak), the industry factor has gained its importance with the exhibition of an uptrend. However, the increased regional and country risks have more profound impact on the industry factor, which have reduced the premia for the industry factor in the later sample period. This is more prominent during the first recovery period from 1994 to mid-2001, during which the increases in country and regional premia in 1999 have gradually deteriorated the performance of the industry factor.



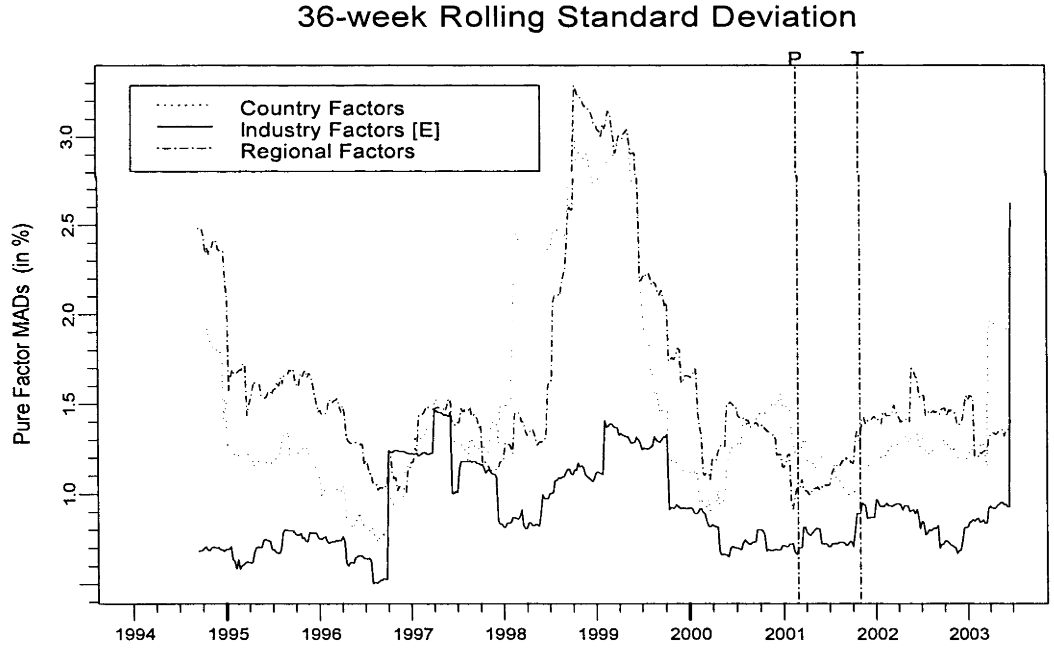
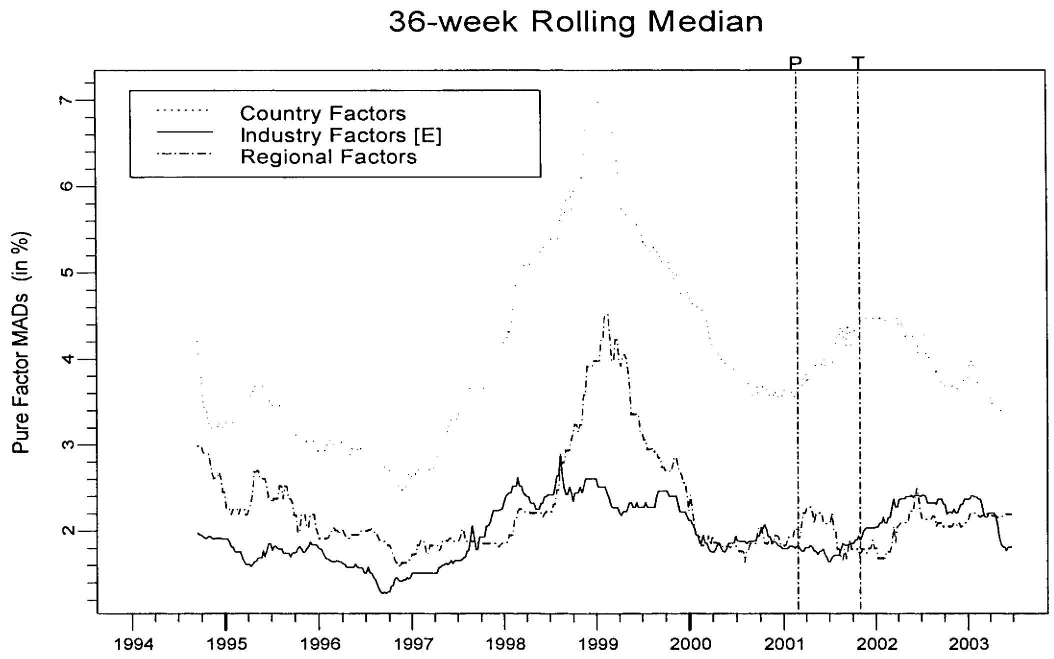


Figure 6.4. 36-week rolling averages and standard deviations of equally-weighted aggregate industry (ten FTSE Economic Groups), regional and country factors (20 emerging markets) during the period 1994 –2003.

In these plots, industry, country, and regional factors are aggregated as the cross-sectional averages of absolute values of the estimated factor loadings for 10 FTSE Economic Groups, 20 emerging markets, and 3 regions. Within each rolling window, means and standard deviations are computed for each aggregate factor. "P" and "T" denote the peak and trough dates of the U.S. business cycles as identified by National Bureau of Economic Research during 1994 - 2003.

36-week Rolling Median



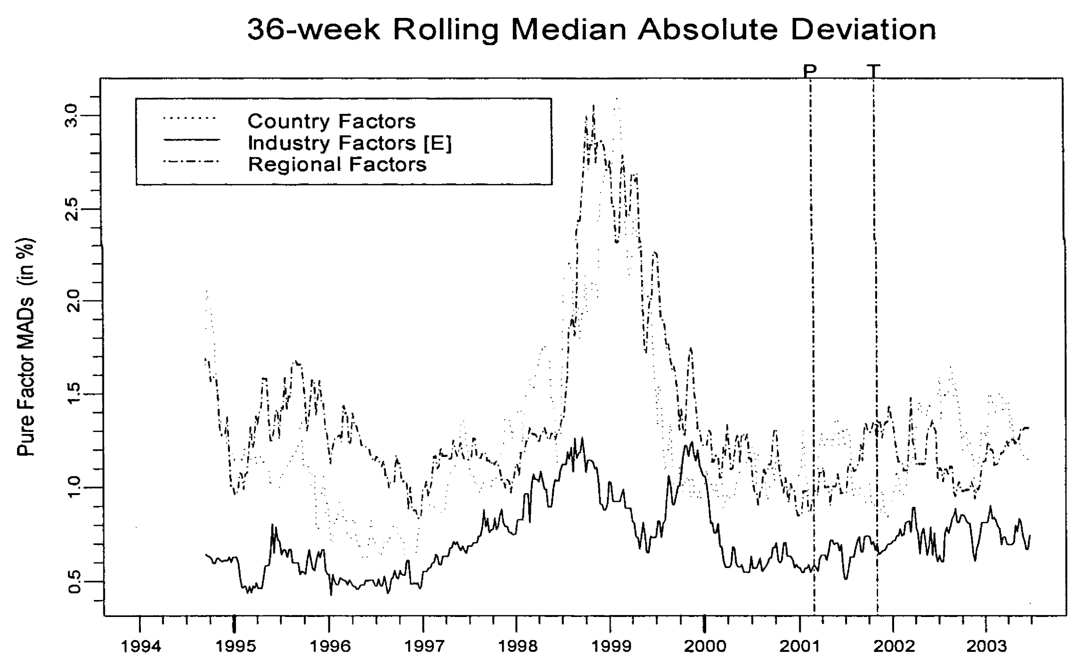


Figure 6.5. 36-week rolling medians and MADs of equally-weighted aggregate industry (ten FTSE Economic Groups), regional, and country factors (20 emerging markets) during the period 1994 – 2003.

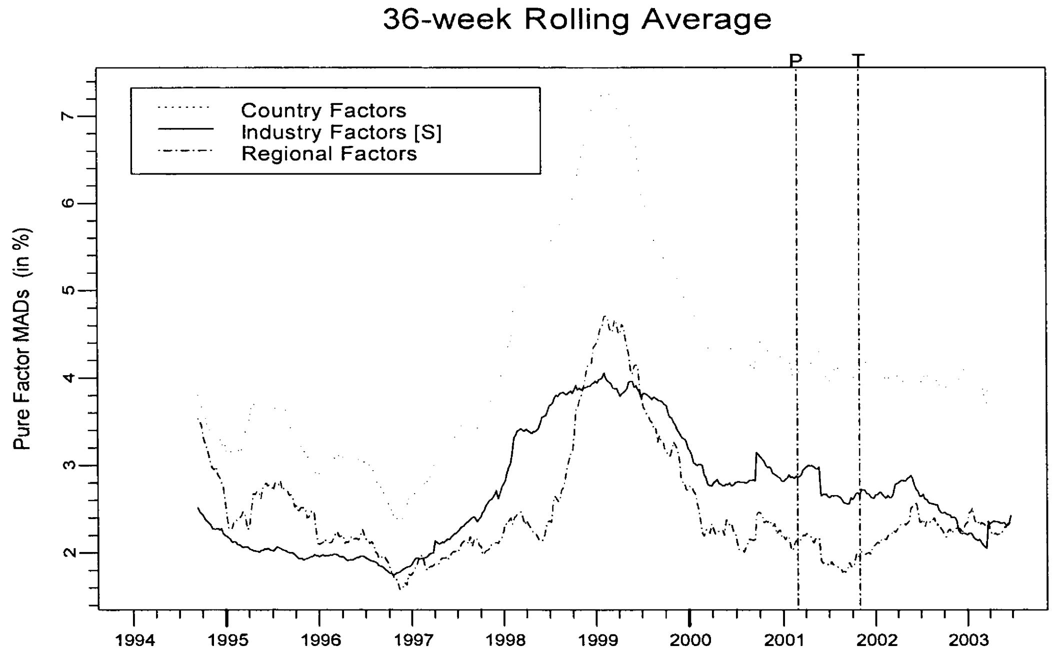
In these plots, industry, country, and regional factors are aggregated as the cross-sectional averages of absolute values of the estimated factor loadings for 10 FTSE Economic Groups, 20 emerging markets, and 3 regions. Within each rolling window, medians and MADs (center is defined as median) are computed for each aggregate factor. "P" and "T" denote the peak and trough dates of the U.S. business cycles as identified by National Bureau of Economic Research during 1994 - 2003.

In the second recovery period from 2002 to mid-2003, the industry factor has exhibited a solid improvement in its performance whereas the country factor has lost its importance with the downward trend. On the other hand, during the recession period (from previous peak to this trough) from mid-2001 to late-2001, the industry factor has lost its importance relative to country and regional factors that exhibit an upward trend.

The plot of rolling standard deviations of each factor also corroborates the above results but the regional factor is more volatile than the country and industry factors, especially during the period of 1998-2000. In contrast, the "bad" news intrigued in developed markets, such as the 9/11 Terrorists Attack in the U.S., does not introduce extra volatility into all three factors as the regional financial crises do. The bottom panel of Figure 6.4 also shows that during recent years, both regional and country factors have shown increased volatilities relative to the industry factor, indicating of the increased impact from the regional and country factors. In the last rolling window, the industry factor has shown a suspicious spike, which is indicative of the influence from the outlier observation during that period. In an attempt to mitigate the annoying impact from possible outliers, Figure 6.5 provides the time-series plots for medians and MADs of each factor.

The plot in the top panel of Figure 6.5 almost produces the same result as in the top panel of Figure 6.4. Measured as medians, the number of periods that the industry factor overshoots the regional factor has increased and this phenomenon is more pronounced during the recent years. The bottom panel of Figure 6.5 has shown an interesting pattern for the industry factor with respect to the business cycles. That is, during the two recovery periods, the industry factor has shown an upward trend in MADs; whereas during the recession period, the MADs are less volatile. This result may suggest the importance of the industry factor in determining the market volatility for the 20 emerging markets during the periods with less stringent business environment.

Are the empirical findings robust to different granularity of industry classification? Figures 6.6 and 6.7 supply the answer. In the top panel of Figure 6.6, the industry factor plays a more prominent role in determining the emerging market performance than it does in Figure 6.4. The industry factor overshoots the regional factor during the most of the sample period, although it is still dominated by the country factor.



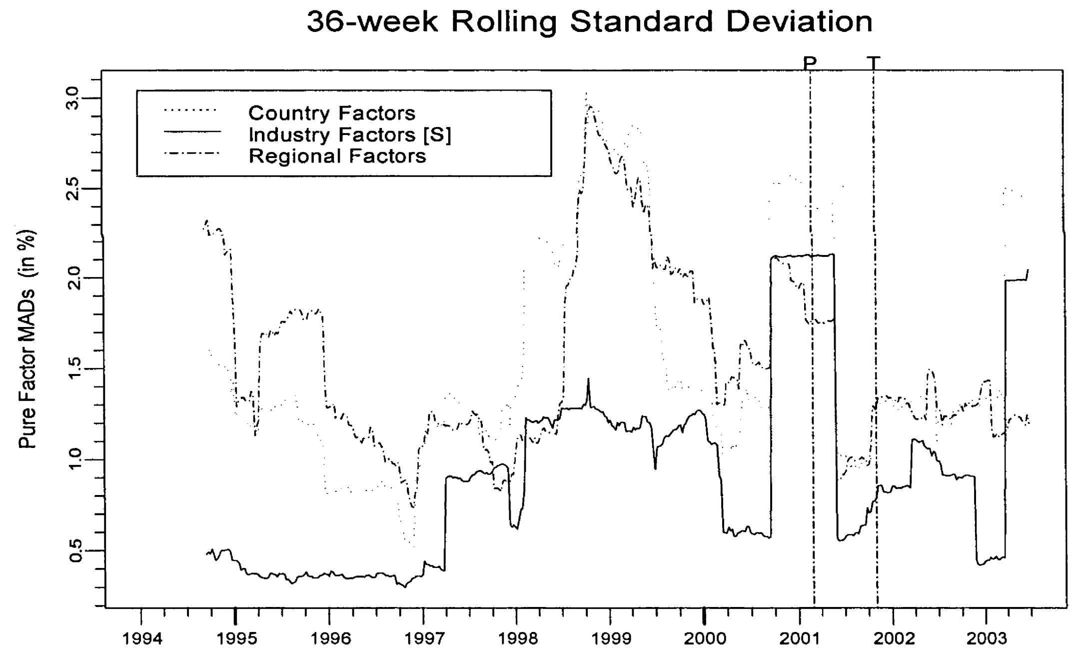
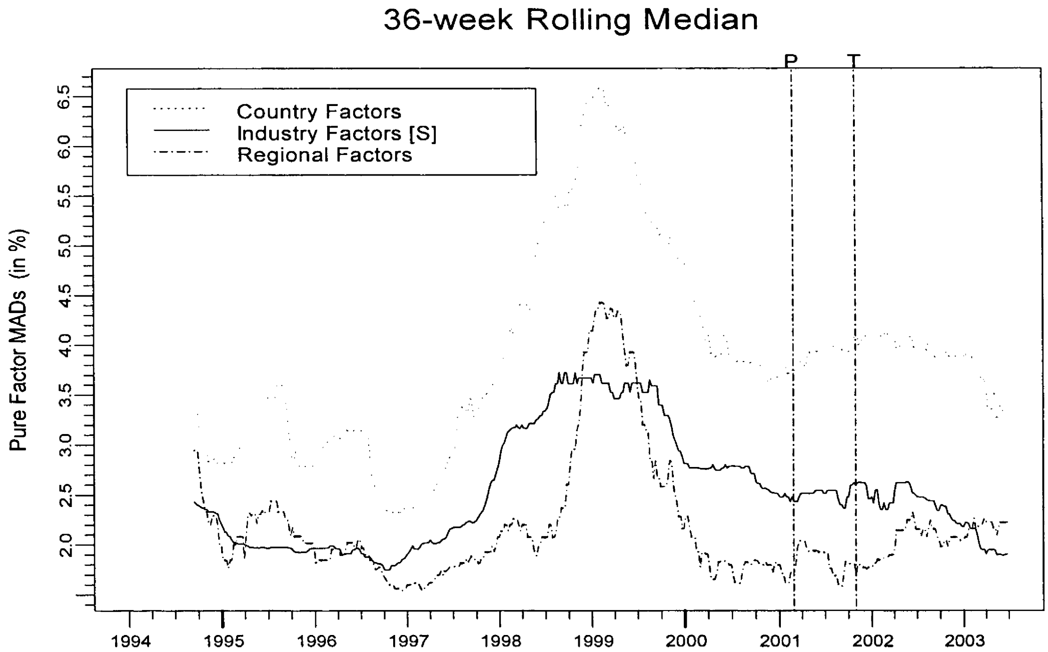


Figure 6.6. 36-week rolling averages and standard deviations of equally-weighted aggregate industry (39 FTSE Industry Sectors), regional, and country factors (20 emerging markets) during the period 1994 –2003.

In these plots, industry, country, and regional factors are aggregated as the cross-sectional averages of absolute values of the estimated factor loadings for 39 FTSE Industry Sectors, 20 emerging markets, and 3 regions. Within each rolling window, means and standard deviations are computed for each aggregate factor. "P" and "T" denote the peak and trough dates of the U.S. business cycles as identified by National Bureau of Economic Research during 1994 - 2003.



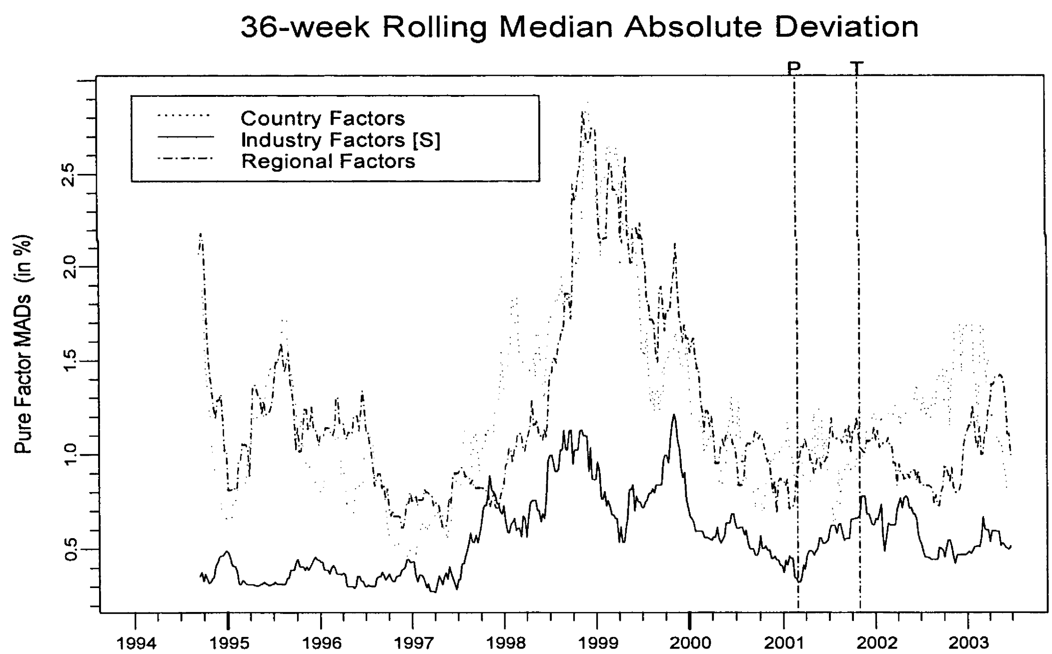


Figure 6.7. 36-week rolling medians and MADs of equally-weighted aggregate industry (39 FTSE Industry Sectors), regional, and country factors (20 emerging markets) during the period 1994 – 2003.

In these plots, industry, country, and regional factors are aggregated as the cross-sectional averages of absolute values of the estimated factor loadings of 39 FTSE Industry Sectors, 20 emerging markets, and 3 regions. Within each rolling window, medians and MADs (center is defined as median) are computed for each aggregate factor. "P" and "T" denote the peak and trough dates of the U.S. business cycles as identified by National Bureau of Economic Research during 1994 – 2003.

Analogous to Figure 6.4, the industry factor in this plot also exhibits upward trend during two recovery periods of the global business cycles.

During the first recovery period, the industry factor has experienced a significant increase in its premium during the crisis period of 1997-2000, which is less pronounced in Figure 6.4. This is also confirmed by a plot of medians in the top panel of Figure 6.7, which are less sensitive to outliers than means. This result may suggest that the increased regional and country factors may lead to the increased risk for the stocks listed in these regions, which invites higher return as demanded by investors. The bottom panel of Figure 6.6, however, provides a nebulous picture about the volatility of each factor because of the existence several spikes, typical results worked out by outliers. With the robust measures of dispersion, the bottom panel of Figure 6.7 shows that when volatility measured as MADs, the regional factor is as volatile as the country factor and closely traces the country factor during the most of the sample period. On the other hand, the volatility of the industry factor is almost identical to the pattern in Figure 6.5.

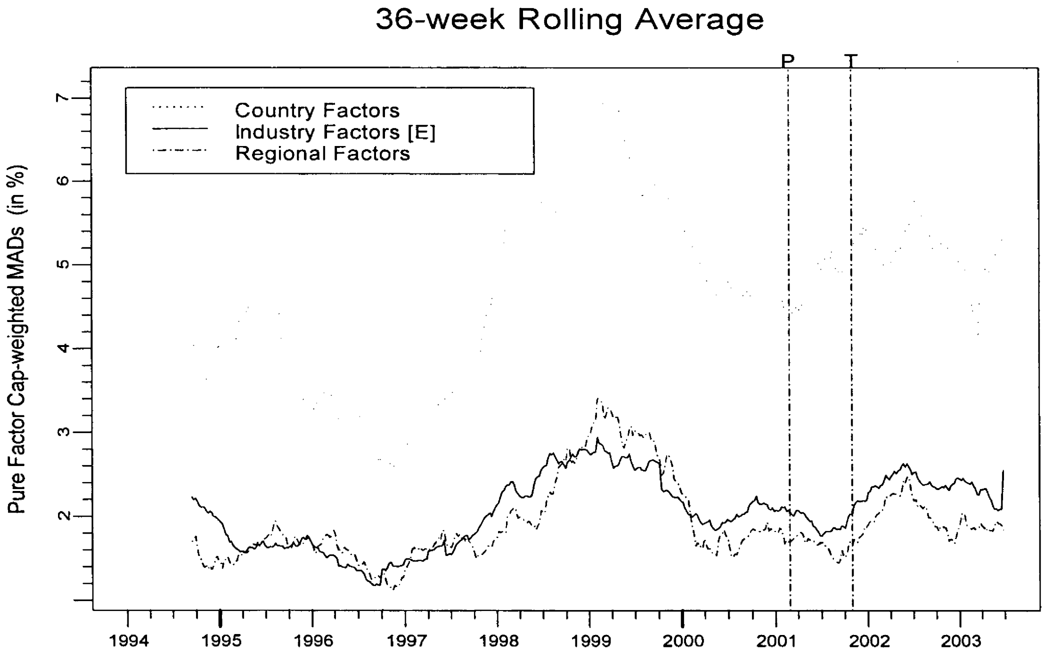
As a conclusion, the time-series plots and the associated analyses in this section have shown that during the sample period, the country factor dominates other two factors in determining the average returns of stocks listed in the 20 emerging markets with apparent geographical assignment. Under a broad industry classification system, the regional factor dominates the industry factor during the most of the sample period in determining the average security returns. However, this situation has reversed when a refined industry classification system is used, in which the industry factor dominates regional factor. On the other hand, time-series plot of the proxy for the volatility of each factor shows that the regional factor is as volatile as the country factor and sometimes it is more volatile, which confirms the EGARCH results in the previous sections.

When examined in association with business cycles, the plots show that the industry factor has exhibited the upward trend during the recovery periods and downward trend during the recession periods in the plots of means and standard deviations. This pattern is more prominent when medians and MADs are used and when a refined industry classification system is used. Notice that the aggregate country, regional and industry factors plotted in Figure 6.4 through Figure 6.7 are equally-weighted cross-sectionally. Given that most of empirical studies on the relative contribution of each factor to country performance with the dynamic framework are based upon a capital-weighting scheme, the following section will present the same plots but with a capital-weighting scheme as a complement.

6.4.3 Value-Weighted Aggregate Industry, Country and Regional Factors

Figure 6.8 presents the time-series plots of means and standard deviations of each factor aggregated from value-weighted absolute deviations of its constituent countries, regions, and industries. Analogous to the previous section, industry factors used in this plot and those followed are estimated from a sample consisting of all 33 countries. Notably, the value-weighted regional factor will be dominated by Asia and Latin America, given their dominant weights during the sample period.

The top panel of Figure 6.8 shows that the country factor is dominant over other two factors, consistent with evidence provided in the previous section where each factor is equally-weighted. The industry factor closely trails the regional factor during the sample period, suggesting that the industry factor is as important as the regional factor in determining the average security returns. Given the dominance of Asia and Latin America, the comovement of regional and industry factors may also suggest that the industry factor and the regional factor are as important as each other for Asian and Latin American stock markets. Notice that the regional premium in Figure 6.8 is also less in its magnitude than the regional premium in Figure 6.4, especially during the crisis period 1998-2000. The significant difference of aggregate regional premium between two plots may indicate that Europe is an important contributor to the variation in the regional premium, consistent with the evidence provided in Figure 6.2 and Figure 6.3 where time-series plot of three regional factors are provided. When examined in association with the business cycles, the industry factor also exhibits an upward trend during the recovery periods and a downward trend during the recession period. There is also a similar pattern in the regional factor, but not as obvious as the industry factor. At first glance, it is counterintuitive to see that the industry factor closely follows the regional factor even during the crisis period, which is totally different from the plot in Figure 6.4 where a significant gap appears during the same period.



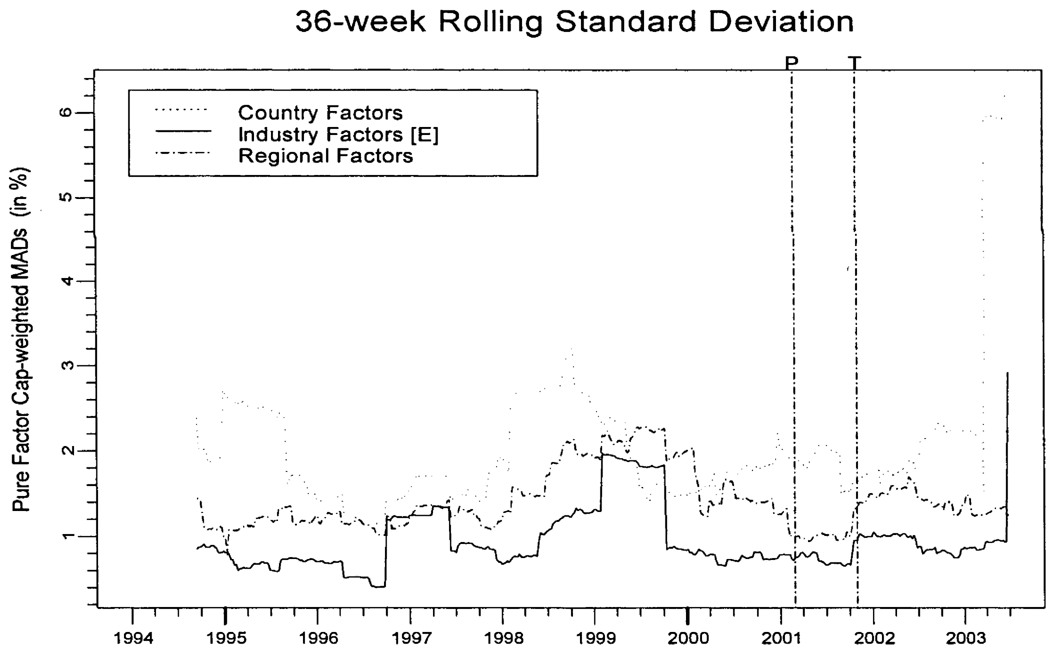
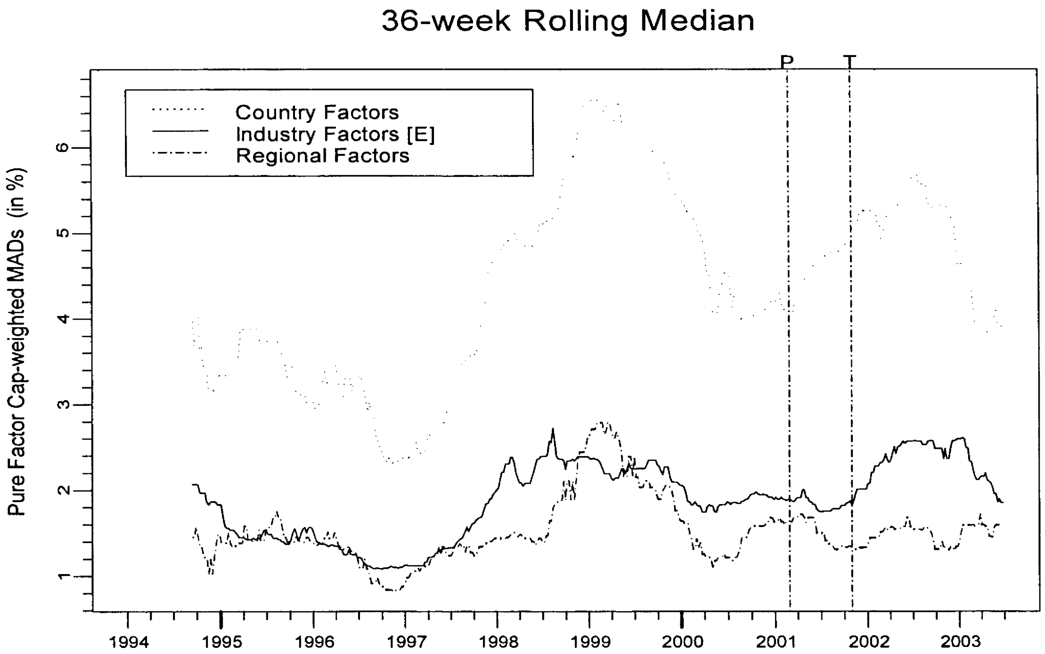


Figure 6.8. 36-week rolling averages and standard deviations of value-weighted aggregate industry (ten FTSE Economic Groups), regional, and country factors (20 emerging markets) during the period 1994 –2003.

In these plots, industry, country, and regional factors are aggregated as the cross-sectional value-weighted absolute values of the factor loadings of 10 FTSE Economic Groups, 20 emerging markets, and 3 regions. Capital-weights are computed using market capitalization at the beginning of a synthetic week (Wednesday-to-Wednesday) for the corresponding industries, countries, and regions. Within each rolling window, means and standard deviations are computed for each aggregate factor. "P" and "T" denote the peak and trough dates of the U.S. business cycles as identified by National Bureau of Economic Research during 1994 - 2003.



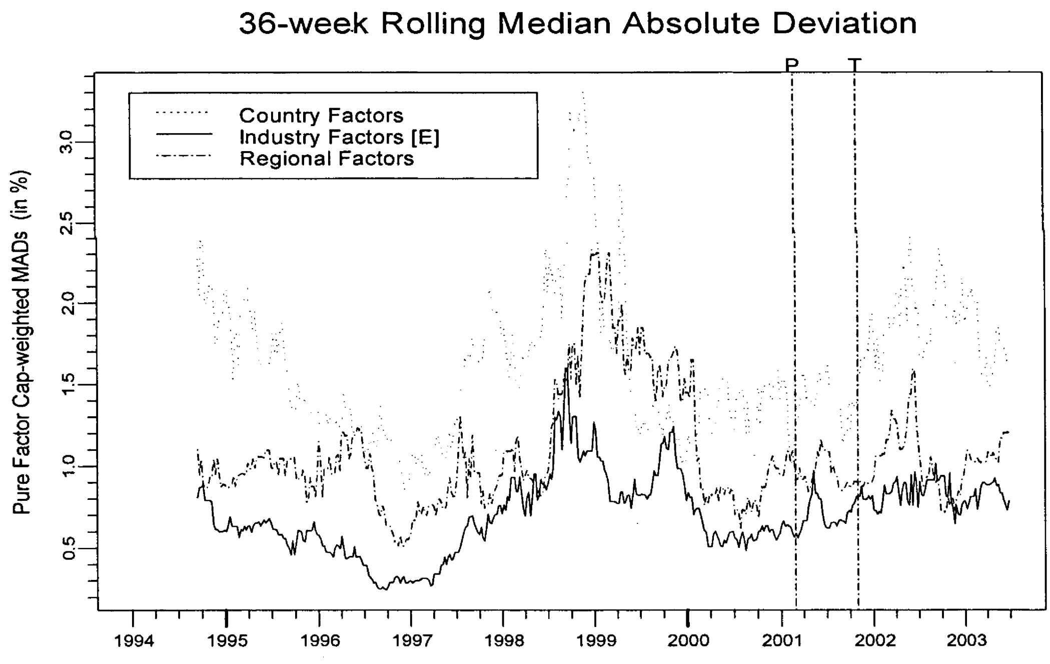


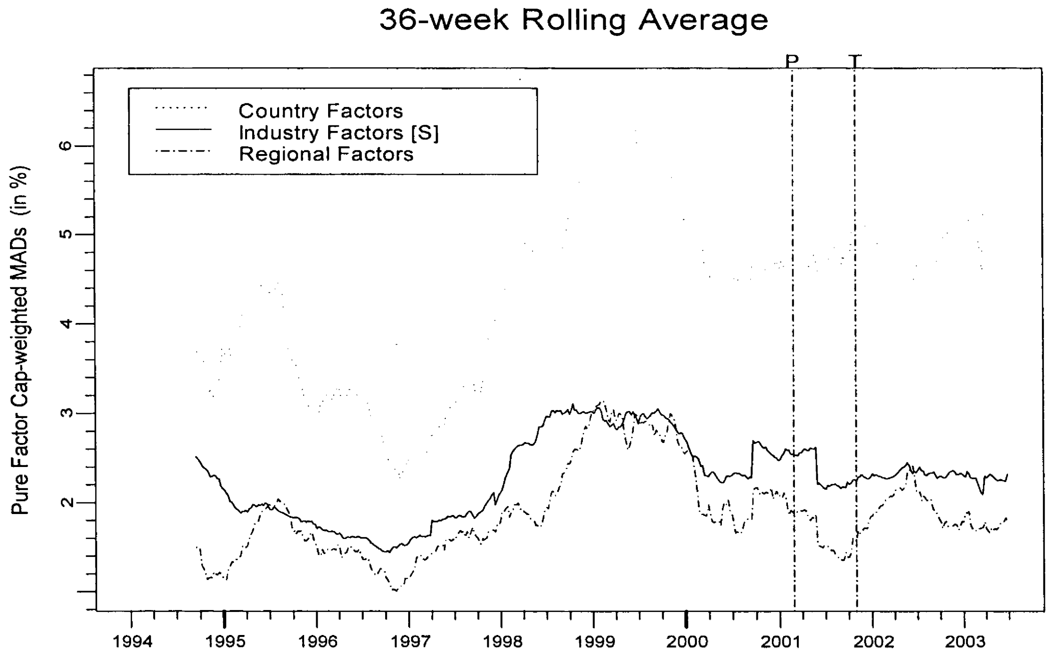
Figure 6.9. 36-week rolling medians and MADs of value-weighted aggregate industry (ten FTSE Economic Groups), regional, and country factors (20 emerging markets) during the period 1994 – 2003.

In these plots, industry, country, and regional factors are aggregated as the cross-sectional value-weighted absolute values of the estimated factor loadings of 10 FTSE Economic Groups, 20 emerging markets, and 3 regions. Capital-weights are computed using market capitalization at the beginning of a synthetic week (Wednesday-to-Wednesday) for the corresponding industries, countries, and regions. Within each rolling window, medians and MADs (center is defined as median) are computed for each aggregate factor. "P" and "T" denote the peak and trough dates of the U.S. business cycles as identified by National Bureau of Economic Research during 1994 - 2003.

The difference is justified by the evidence produced in the previous sections that Asia and Latin America have distinctive regional performances during the later sample period. Hence, the result in Figure 6.8 is not that surprising because a regional crisis is less contagious across regions as it did in early 1980s.

On the other side, rolling standard deviations of both country and industry factors in the bottom panel of Figure 6.8 have exhibited significant spikes during 2003, indicative of the influence from outliers. Hence, Figure 6.9 also provides the time-series plots for two robust measures, i.e., medians and MADs.

With medians, the top panel of Figure 6.9 has displayed a similar pattern as in Figure 6.8. The uptrend for the industry factor during the two recovery periods is more pronounced in this plot, which indicates increasing importance of the industry factor during those specific phases of the business cycles; this trend is less prominent for the regional factor. With MADs being used to proxy for the volatility of each factor, the bottom panel of Figure 6.9 has displayed a less extreme picture than the plot of rolling standard deviations in Figure 6.8. Furthermore, a comparison of MADs for each factor between Figure 6.5 and Figure 6.9 reveals that the difference in the volatility measures of three factors are less extreme under the capital-weighting scheme than the case under equally-weighting scheme. Unlike Figure 6.5 where the regional factor is intermingled with the country factor during the most of sample period, in Figure 6.9, the volatility of the country factor dominates other two factors. This suggests that the country factor may be a major contributor to volatility of a value-weighted portfolio of stocks listed in the 20 emerging markets. Once again, during two recovery periods, there is an obvious upward trend for industry factor; analogous to bottom panel of Figure 6.5, during the crisis period, the increase in the volatilities of regional and country factors appears to have reduced the volatility of the industry factor significantly. This evidence suggests that during the crisis period, local and regional factors are more important than industry factor, which is more globally-oriented.



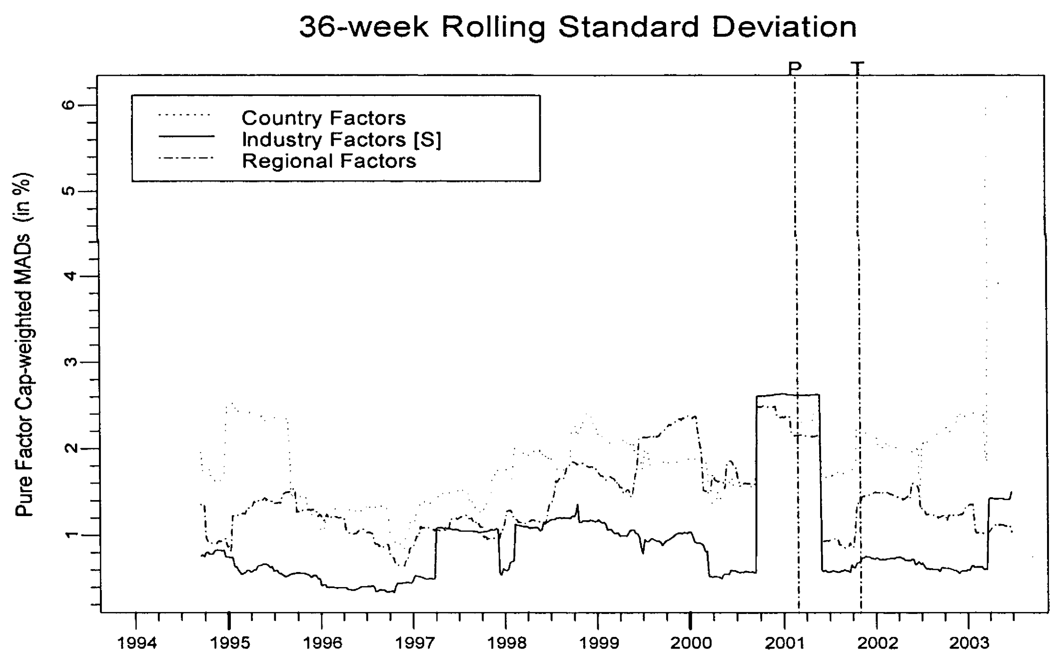
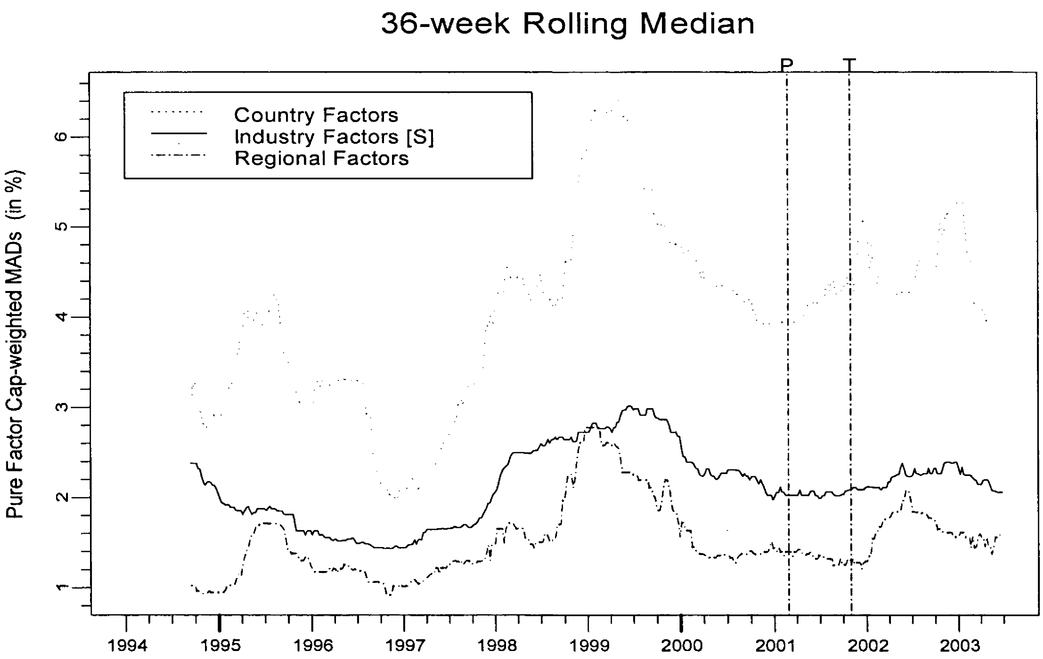


Figure 6.10. 36-week rolling averages and standard deviations of value-weighted aggregate industry (39 FTSE Industry Sectors), regional, and country factors (20 emerging markets) during the period 1994 –2003.

In these plots, industry, country, and regional factors are aggregated as the cross-sectional value-weighted absolute values of the estimated factor loadings for 39 FTSE Industry Sectors, 20 emerging markets, and 3 regions. Capital-weights are computed using market capitalization at the beginning of a synthetic week (Wednesday-to-Wednesday) for the corresponding industries, countries, and regions. Within each rolling window, means and standard deviations are computed for each aggregate factor. "P" and "T" denote the peak and trough dates of the U.S. business cycles as identified by National Bureau of Economic Research during 1994 - 2003.



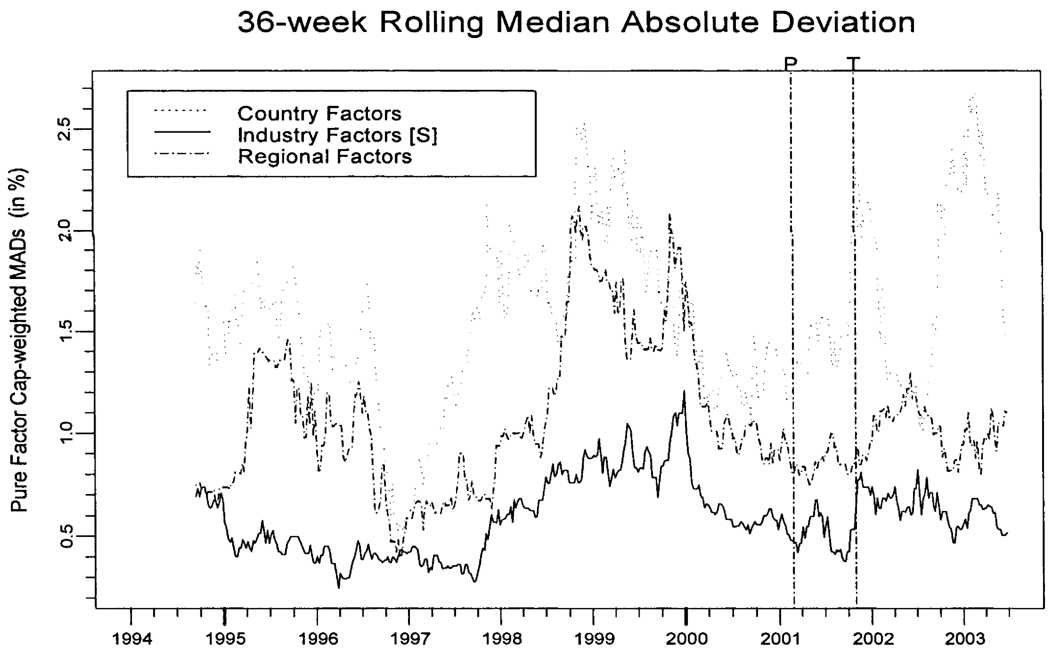


Figure 6.11. 36-week rolling medians and MADs of value-weighted aggregate industry (39 FTSE Industry Sectors), regional, and country factors (20 emerging markets) during the period 1994 – 2003.

In these plots, industry, country, and regional factors are aggregated as the cross-sectional value-weighted absolute values of the estimated factor loadings for 39 FTSE Industry Sectors, 20 emerging markets, and 3 regions. Capital-weights are computed using market capitalization at the beginning of a synthetic week (Wednesday-to-Wednesday) for the corresponding industries, countries, and regions. Within each rolling window, medians and MADs (center is defined as median) are computed for each aggregate factor. "P" and "T" denote the peak and trough dates of the U.S. business cycles as identified by National Bureau of Economic Research during 1994 - 2003.

As a complement to the above analysis, Figure 6.10 also provides the time-series plots for means and standard deviations of each factor estimated from a refined industry classification system. Two robust measures, i.e., medians and MADs, are presented in Figure 6.11.

Analogous to the similar plots in Figure 6.6 and Figure 6.7, the first impression from the top panels of both figures is that the industry factor dominates the regional factor during the most of sample period, but not as important as country factor, in determining the average country returns of the 20 emerging markets. The only exception is that during the crisis period of 1998-2000, the regional factor has gained its importance relative to the industry factor. On the other hand, the bottom panels of both figures have shown that the regional factor is as volatile as the country factor. This pattern is more pronounced during the crisis period, indicating the important role of the regional factor in the chain of financial crises during that specific period. In recent years, however, the country factor seems to have resumed its importance in explaining the volatility of country returns; the magnitude of its two volatility measures, i.e., standard deviations and MADs, is as big as or even bigger than it is during the crisis period. Notice that the country factor is aggregated from capital-weighting the cross-sectional country factor of each market and the regional weights of Asia and Latin America are dominant over the sample period. The rise of the country factor during recent years can ascribed to the weakening of country fundamentals of those major economies located in Latin America during 2001 and aftermath, but less contagious at regional level because of the moderate volatility of the regional factor during this period.

Overall, time-series plots in this section suggest that when each factor is aggregated from its component countries, industries, and regions via a capital-weighting scheme, the country factor still dominates other two factors in determining the average country returns during the sample period. This pattern is less pronounced when measuring each factor's contribution to the volatility of country returns, in which the regional factor is as volatile as, or during the crisis period, more volatile than country factor. Industry factor, on the other hand, is an important contributor, at least as important as regional factor, to formulating the average market returns. As expected, the industry factor has strengthened its importance relative to the regional factor under a refined industry classification system.

6.5 Chapter Summary

In this chapter, a comprehensive analysis has been performed on the relative importance of industry, country and regional factors in determining the market performance of 20 emerging markets of Asia, Europe and Latin America during the period of 1994-2003. Regional factors are estimated from a two-stage dummy variable regression model extended from the model set up by Heston and Rouwenhorst (1994).

Major empirical findings of this chapter are summarized as follows. Variance ratio analysis suggests that the country factor is still a dominant force in determining emerging market performance. Empirical evidence also shows that the regional factor is important in some emerging markets. This phenomenon is more pronounced in a couple of European emerging markets than their Asian and Latin American counterparts. Industry factor, measured as a value-weighted sum of industry factors for each country, is the least important factor among the three.

When each factor is augmented within the ICAPM model, estimation results have confirmed the results in the previous chapter that the country factor and world market factor explain a sizable proportion of variation in market returns during the sample period. For most emerging markets, the regional factor also plays an important role in determining average market returns but second to the world market and country factors. In a four-factor model, however, regression results show that some national markets are more sensitive to the regional factor than other three factors. Industry factor, on the other hand, is only marginally important in a couple of emerging markets, such as Korea, Pakistan, and Taiwan with advanced economies; some of these emerging markets have the unexpected negative exposures to industry factor.

When each factor is augmented within the conditional variance equation of several EGARCH (1, 1) models with their mean equation specified as the ICAPM model, the estimation results indicate that country and regional factors are two important factors in determining the variation in the residuals from the ICAPM model, which has the interpretation as the unsystematic risk that cannot be explained by the returns on world market portfolio. Industry factor, on the other hand, is also important for a couple of countries under the ten broad FTSE Economic Groups. The estimation results from a finely-partitioned industry classification have shown that the number of countries with significant exposures to the industry factor has increased. The above results are also robust to a model where leverage is considered.

Within a dynamic framework, time-series plots of each aggregate factor, either equally- or value-weighted, have confirmed the above conclusion that the country factor dominates industry and regional factors in determining the performance of 20 emerging markets. Under a broad industry classification system, the regional factor dominates the industry factor during the most of the sample period. However, this situation has reversed when a refined industry classification system is used, in which the industry factor dominates regional factor. On the other hand, time-series plot of the proxy for the volatility of each factor shows that the regional factor is as volatile as and sometimes it is more volatile than country factor. When examined in association with the global business cycles, the plots show that the industry factor has exhibited an uptrend during the recovery/expansion periods and a downtrend during the recession/contraction periods in the time series plots of means and standard deviations of each aggregate factor. This pattern has become more prominent when medians and MADs are used and when a refined industry classification system is used.

CHAPTER VII

SUMMARY AND CONCLUSIONS

7.1 Summary and Conclusions

The principal purpose of this study is to investigate the relative importance of industry, country and regional factors in determining the variation in realized market returns and volatilities in both developed and emerging stock markets. To this end, this study has employed an up-to-date dataset of 33 major stock markets (among them, eleven are developed markets and 22 are emerging markets) from the FTSE All-World Index Series$^{TM/SM}$ that accounts for about 90 percent of market capitalization in each stock market during the period of 1994-2003. FTSE All-World Index Series$^{TM/SM}$ has categorized its universe of stocks into industries according to a three-level FTSE Global Classification System. Weekly, U.S. dollar-denominated industry returns are used to estimate each factor from a dummy variable regression model of Heston and Rouwenhorst (1994) and an extension of that model.

Both variance ratio analysis and regression-based analysis have been employed to examine each factor's contribution to market performance. Furthermore, each factor has also examined within a dynamic framework. The following section summarizes the major findings of this study.

A. Major Findings of This Study

Major findings in thesis are recapped as follows. First of all, when market returns are decomposed into industry and country components, the estimation results in Chapter 5 illustrate that the country factor still dominates the industry factor in explaining the variation in market returns and volatilities of 33 major stock markets during the period of 1994-2003. When the sample has been divided into two sub-samples comprising either 11 developed or 22 emerging markets, the analysis suggests that the dominance of the country factor is more prominent in emerging markets than developed markets. Moderate evidence has also been found to support the hypothesis that the industry factor is as important as the country factor in explaining the variation in developed market returns.

Within the dynamic framework, the industry factor has gained its importance relative to the country factor, especially in developed markets. When each factor is examined in association with the global business cycles, proxied by the U.S. business cycles as documented by National Bureau of Economic Research, the time-series plots suggest that the industry factor has exhibited an uptrend during the two recovery/expansion periods (defined as the period from the previous trough to this peak). This pattern is more pronounced in developed markets. No clear picture, however, has emerged for the behavior of the industry factor during the only recession/contraction period (defined as the period from last peak to this trough). For emerging markets, rolling averages and standard deviations plots have shown that during recent years, the industry factor has also become an important factor in determining emerging market returns with its showing an uptrend in the later sample period; meanwhile, the country factor in emerging markets has become less important. The above results are quite robust when rolling medians and MADs are used.

In an extended two-stage model of the dummy variable regression of Heston and Rouwenhorst (1994), in which the regional factor is extracted from a sample comprising 20 emerging markets of Asia, Europe and Latin America, the empirical results in Chapter 6 suggest that the regional factor is important for this group of emerging markets but second to country factor. European emerging markets have the most proportion of the variation in their market returns explained by the regional factor among three regions. The rolling averages and medians plots corroborate the results from variance ratio and regression-based analyses that during the period of 1994-2003, the regional factor is more important than the industry factor in explaining the average country returns, especially during the crisis period of 1998-1999; both factors are, however, less important than country factor. When measured in terms of two volatility measures, the regional factor is as important as the country factor in explaining volatility of country returns, followed by industry factor. Less clear pattern is present within different phases of the global business cycles.

B. Implications for International Portfolio Management

The empirical results of this study have profound implications for international portfolio managers. The dominance of the country factor in emerging markets suggests that emerging markets are still relatively segmented from world capital market; a portfolio diversified across developed and emerging markets can still provide significant diversification benefits to investors, although there is weak evidence that during the recovery periods (defined as the period from the previous trough to this peak) of business cycles global industry factors are gaining their importance.

Although Heston and Rouwenhorst (1994) style dummy variable regression model does not identify the exact constituents of the industry, country and regional factors, yet, those estimates can provide investment practitioners a guidance on which subset of proxies to be chosen from the limitless universe of pre-specified variables to predict their portfolio performance.

Moreover, for developed markets, empirical evidence suggests that during recent years, though the country factor still dominates market performance, the industry factor has also become an increasingly important component of developed market returns. Hence, a home-biased portfolio could be an inefficient asset allocation strategy in that the potential gains from international diversification can be exploited not only from the low correlations between markets, but also from the their different industrial compositions. Further, the dominance of the industry factor is also related to the business environment. During recovery/expansion periods, the industry factor may be more important in developed markets; whereas in recession/contraction periods, the industry factor succeeds to country factor. For investors, if industry risk is priced as in developed markets, they can construct a portfolio with better risk-return profile by diversifying it across industries in addition to geographic diversification across countries.

For emerging markets, however, the country factor is still a dominant force in driving emerging market performance. This implies that emerging markets are still quite segmented from world capital market, despite the globalization of world economy and world capital market. Evidence presented in Chapter 6 also shows that geographical proximity also gains its importance in determining emerging market returns. This phenomenon is more prominent during the financial crisis periods, given the increasing integration of markets at the regional level. This implies that for international investors interested in emerging markets, a portfolio diversified across regions may reduce more risk than a portfolio concentrated in markets in one region.

Weak evidence has also been provided in Chapter 5 that a portfolio diversified across developed and emerging markets may generate higher returns that a portfolio concentrated in developed markets or a portfolio concentrated in emerging markets alone.

One thing should be kept in mind! It is dubious that the country or industry portfolios risk premia resulting from this thesis are achievable. Investment in a country index, for example, would encompass other exposures that need to be offset in order to capitalize on the pure country factor.

7.2 Limitations of This Study

Like other empirical studies, this study also has its limitations. First of all, due to the data availability, industry, country and regional factors are estimated from industry returns rather than individual security returns. Although Griffin and Karolyi (1998) have argued that the estimated factor loadings are still unbiased and quantitatively equal to those estimated from individual security returns, those estimates are not efficient and consistent. Hence, this inefficiency may introduce biases into conclusions based upon the analysis of means and variances of each factor, such as variance ratio analysis, which in turn produce spurious inferences.

Second, currency risk has not been explicitly controlled in regression models. As argued before, currency risk may be mainly loaded onto the country factors estimated from Heston and Rouwenhorst (1994) style dummy variable regression model. However, the estimated industry and regional factors can still take some impact of currency risk, which in turn over-estimated the volatility of those two factors. This may be more prominent in developed markets than in emerging markets. Because during the sample period of 1994-2003, most emerging markets have pegged their currencies either to one of the hard currencies, such as the U.S. dollar, or to a basket of hard currencies as the case in Singapore. In contrast, most of developed markets have free-floated their currencies, which tend to introduce excess volatility into industry and regional factors.

Thirdly, as mentioned in Chapter 4, the sample period covered in this thesis is relatively volatile for most of 33 markets due to either the chain of financial crises in emerging markets, or the unusual performance of the IT industry, or the notorious 9/11 Terrorists Attack in the U.S. of 2001. Therefore, for some markets, the estimated country factor may have outliers, which in turn may distort the average country performance and over-estimate volatility of country factor. This is evident in the wide discrepancy of means and medians in summary statistics on market performance. Although outliers have been explicitly controlled via robust regression and robust measures of location and dispersion, spurious results can still be produced within an analysis based upon a rolling window as short as 36 weeks. As a partial solution to this problem, a rolling window of 12 and 52 weeks is also examined (the plots are not provided in this thesis in order to save space and available from author upon request) and major conclusions are not significantly different from the analysis based upon the window size of 36 weeks.

Fourthly, in the regression-based analysis, the estimated factor loadings can be roughly translated as returns on factor mimicking portfolio with maximum exposure to industry, country and regional factors. This argument is also under attack on their appropriateness as the proxy for each factor. Further, the incorporation of each factor into its conditional variance equation may also be problematic on the assumption that those factors are exogenous to residuals from the two specifications for the mean equations.

Fifthly, when examining each factor's importance in pricing international security returns during different phases of the global business cycles, the U.S. business cycles as documented by National Bureau of Economic Research have been chosen as the proxy. Despite recent studies on the synchronization of the global business cycles suggest the possible existence of the coordination among countries due the increasing globalization of the world economy, the empirical results are less pronounced than the theory suggests. Therefore, the conclusions drawn upon the U.S. business cycles may be more limited as evidence documenting the dynamics of each factor.

Finally, in Chapter 6, an extended two-stage dummy variable regression model has been employed to extract the regional factor from "pure" country returns that are estimated in the first stage. Therefore, the quality of the estimated regional factors as proper proxies for each region are conditional upon the efficiency of the estimated pure country returns in the first stage. In addition, 20 cross-sectional observations may not be enough to produce efficient estimates for regional factors, which may lead to the biases in the conclusions made upon means and standard deviations. Further, the country grouping strategy also invites criticisms. For example, the inclusion of Pakistan and

India into an Asia regional group may under-estimate the regional factor, due to their distinctive performance from other Asian countries.

7.3 Further Studies

Several further studies can be extended from this thesis. First of all, the focus of this study is on the contribution of each factor to market performance; the contribution of each factor to industry performance has largely been ignored. Within the same framework as in this study, regression-based analysis can also be applied to the value-weighted global industry returns, instrumental to the understanding the factor structure driving the industry performance.

Second, in EGARCH family of models, the residuals from mean equations are assumed to be normally distributed with zero mean and a conditional variance. Not reported in this thesis, the sum of the estimated coefficients for ARCH and GARCH effects is almost one for almost all countries with different model specifications. Two reasons, among others, are behind this empirical evidence. The first possibility is the persistence in the volatility of the residuals. The other possibility may be due to the misspecification of the distribution of the residuals from the mean equations. As a further attempt, different distributional forms may be specified for the residuals, such as *t*-distribution, and use Bayesian information criterion (BIC) of each model as an indicator of the effectiveness of each model specification.

Further, the dummy variable regression model can also be used to examine the individual security volatilities, using industry dummies to control the possible impact of industry innovations

Finally, this study can also be extended into a multivariate context, in which vector autoregressive models (VAR) or multivariate EGARCH models can be used to explore issues like the impact of industry/country innovations from developed markets, represented by industry/country factors estimated strictly from a sample consisting of developed markets only, on the country performance of emerging markets within a simultaneous system of equations. Or, it can be used to study the industry momentum strategies as delineated in Moskowitz and Grinblatt (1999) to control for economy-wide and industry-specific shocks within different countries.

BIBLIOGRAPHY

Adler, M. and Dumas, B., 1983. "International Portfolio Choice and Corporation Finance: A Synthesis", *Journal of Finance*, vol. 38, no. 3, pp. 925-984.

Baca, P. S., Garbe, L. B. and Weiss, A. R., 2000. "The Rise of Sector Effects in Major Equity Markets", *Financial Analysts Journal*, vol. 56, no. 5, pp. 34-40.

Bae, K.-H., Karolyi, G. A. and Stulz, R. M., 2003. "A New Approach to Measuring Financial Contagion", *Review of Financial Studies*, vol. 16, no. 3, pp. 717-763.

Bansal, R., Hsieh, D. A. and Viswanathan, S., 1993. "A New Approach to International Arbitrage Pricing", *Journal of Finance*, vol. 48, no. 5, pp. 1719-1747.

Beckers, S., Connor, G. and Curds, R., 1992. "The Relative Importance of Common Factors across the European Equity Markets", *Journal of Banking and Finance*, vol. 16, no. 1, pp. 75-95.

Beckers, S., Connor, G. and Curds, R., 1996. "National Versus Global Influences on Equity Returns", *Financial Analysits Journal*, vol. 52, no. 2, pp. 31-39.

Beckers, S., Grinold, R., Rudd, A. and Stefek, D., 1992. "The Relative Importance of Common Factors across the European Equity Markets", *Journal of Banking and Finance*, vol. 1, no. 16, pp. 75-95.

Bekaert, G., 1995. "Market Integration and Investment Barriers in Emerging Equity Markets", *World Bank Economic Review*, vol. 9, no. 1, pp. 75-107.

Bekaert, G. and Harvey, C. R., 1995. "Time-Varying World Market Integration", *Journal of Finance*, vol. 50, no. 2, pp. 403-444.

Bekaert, G. and Harvey, C. R., 1997. "Emerging Equity Market Volatility", *Journal of Financial Economics*, vol. 43, no. 1, pp. 29-77.

Bekaert, G. and Harvey, C. R., 2000. "Foreign Speculators and Emerging Equity Markets", *Journal of Finance*, vol. 55, no. 2, pp. 565-613.

Bekaert, G. and Harvey, C. R., 2002. "Research in Emerging Markets Finance: Looking to the Future", *Emerging Markets Review*, vol. 3, no. 4, pp. 429-448.

Bekaert, G. and Harvey, C. R., 2003. "Emerging Markets Finance", *Journal of Empirical Finance*, vol. 10, no. 1-2, pp. 3-55.

Bekaert, G. and Harvey, C. R., 2003. "Market Integration and Contagion", working paper, no. 9510.

Bekaert, G., Harvey, C. R. and Lumsdaine, R. L., 2002. "Dating the Integration of World Equity Markets", *Journal of Financial Economics*, vol. 65, no. 2, pp. 203-247.

Bekaert, G., Harvey, C. R. and Lundblad, C. T., 2003. "Equity Market Liberalization in Emerging Markets", *Federal Reserve Bank of St Louis Review*, vol. 85, no. 4, pp. 53-74.

Bhattacharya, U., Daouk, H., Jorgenson, B. and Kehr, C. H., 2000. "When an Event Is Not an Event: The Curious Case of an Emerging Market", *Journal of Financial Economics*, vol. 55, no. 1, pp. 69-101.

Bilson, C. M., Brailsford, T. J. and Hooper, V. J., 2001. "Selecting Macroeconomic Variables as Explanatory Factors of Emerging Stock Market Returns", *Pacific-Basin Finance Journal*, vol. 9, no. 4, pp. 401-426.

Bilson, C. M., Hooper, V. and Jaugietis, M., 2000. "The Impact of Liberalization and Regionalism Upon Capital Markets in Emerging Asian Economies", in Choi, J. J. ed., *Asian Financial Crisis: Financial, Structural and International Dimensions*, International Finance Review, vol. 1, Elsevier Science, JAI, New York and Tokyo, pp. 199-235.

Black, F., 1976. "Studies in Stock Price Volatility Changes", *Proceedings of the 1976 Business Meeting of the Business and Economics Statistics Section*, American Statistical Association, pp. 177-181.

Bodnar, G. M. and Gentry, W. M., 1993. "Exchange Rate Exposure and Industry Characteristics: Evidence from Canada, Japan, and the USA", *Journal of International Money and Finance*, vol. 12, no. 1, pp. 29-45.

Bollerslev, T., 1986. "Generalized Autoregressive Conditional Heteroskedasticity", *Journal of Econometrics*, vol. 31, no. 3, pp. 307-327.

Bollerslev, T., 1987. "A Conditionally Heteroskedastic Time Series Model for Speculative Prices and Rates of Return", *Review of Economics and Statistics*, vol. 69, no. 3, pp. 542-547.

Bollerslev, T., Chou, R. and Kroner, K., 1992. "Arch Modeling in Finance: A Review of the Theory and Empirical Evidence", *Journal of Econometrics*, vol. 52, no. 1-1, pp. 5-59.

Brailsford, T. and Heaney, R., 1998. *Investments : Concepts and Applications in Australia*, Harcourt Brace, Sydney.

Brigham, E. F. and Pappas, J. L., 1969. "Rates of Return on Common Stock", *Journal of Business*, vol. 42, no. 3, pp. 302-316.

Brooks, R. and Catao, L., 2000. "The New Economy and Global Stock Returns", working paper, no. WP/00/216.

Campbell, J. Y. and Hamao, Y., 1992. "Predictable Stock Returns in the United States and Japan: A Study of Long-Term Capital Market Integration", *Journal of Finance*, vol. 47, no. 1, pp. 43-69.

Cavaglia, S., Brightman, C. and Aked, M., 2000. "The Increasing Importance of Industry Factors", *Financial Analysts Journal*, vol. 56, no. 5, pp. 41-54.

Cavaglia, S. and Moroz, V., 2002. "Cross-Industry, Cross-Country Allocation", *Financial Analysts Journal*, vol. 58, no. 6, pp. 78-+.

Chamberlain, G. and Rothschild, M., 1983. "Arbitrage, Factor Structure, and Mean-Variance Analysis on Large Asset Markets", *Econometrica*, vol. 51, no. 5, pp. 1281-1304.

Chan, K. C., Karceski, J. and Lakonishok, J., 1998. "The Risk and Return from Factors", *Journal of Financial and Quantitative Analysis*, vol. 33, no. 2, pp. 159-188.

Chan, L. K. C., Hamao, Y. and Lakonishok, J., 1991. "Fundamentals and Stock Returns in Japan", *Journal of Finance*, vol. 46, no. 5, pp. 1739-1764.

Chen, N.-F., Roll, R. and Ross, S. A., 1986. "Economic Forces and the Stock Market", *Journal of Business*, vol. 59, no. 3, pp. 383-403.

Cho, D. C., Eun, C. S. and Senbet, L. W., 1986. "International Arbitrage Pricing Theory - an Empirical-Investigation", *Journal of Finance*, vol. 41, no. 2, pp. 313-329.

Choi, J. J. and Rajan, M., 1997. "A Joint Test of Market Segmentation and Exchange Risk Factor in International Capital Markets", *Journal of International Business Studies*, vol. 28, no. 1, pp. 29-49.

Claessens, S., Dornbusch, R. and Park, Y. C., 2001. "Contagion: Why Crisis Spread and How This Can Be Stopped", in Claessens, S. and Forbes, K. J. eds., *International Financial Contagion*, Kluwer Academic Publishing, Boston, pp. 19-52.

Cochrane, J. H., 2001. *Asset Pricing*, Princeton University Press, Princeton, N.J.

Connor, G., 1984. "A Unified Beta Pricing Theory", *Journal of Economic Theory*, vol. 34, no. 1, pp. 13-31.

Connor, G., 1995. "The Three Types of Factor Models: A Comparison of Their Explanatory Power", *Financial Analysits Journal*, vol. 51, no. 3, pp. 42-46.

Cooper, I. and Kaplanis, E., 1994. "Home Bias in Equity Portfolios, Inflation Hedging, and International Capital Market Equilibrium", *Review of Financial Studies*, vol. 7, no. 1, pp. 45-60.

De Santis, G. and Gerard, B., 1997. "International Asset Pricing and Portfolio Diversification with Time-Varying Risk", *Journal of Finance*, vol. 52, no. 5, pp. 1881-1912.

Diermeier, J. and Solnik, B., 2001. "Global Pricing of Equity", *Financial Analysts Journal*, vol. 57, no. 4, pp. 37-47.

Drummen, M. and Zimmermann, H., 1992. "The Structure of European Stock Returns", *Financial Analysits Journal*, vol. 48, no. 4, pp. 1299-1314.

Dumas, B., Harvey, C. R. and Ruiz, P., 2003. "Are Correlations of Stock Returns Justified by Subsequent Changes in National Outputs?" *Journal of International Money and Finance*, vol. 22, no. 6, pp. 777-811.

Enders, W., 1995. *Applied Econometric Time Series*, Wiley, New York.

Engle, R. F., 1982. "Autoregressive Conditional Heteroscedasticity with Estimates of the Variance of United Kingdom Inflation", *Econometrica*, vol. 50, no. 4, pp. 987-1007.

Engle, R. F. and Ng, V. K., 1993. "Measuring and Testing the Impact of News on Volatility", *Journal of Finance*, vol. 48, no. 5, pp. 1749-1778.

Eun, C. S. and Shim, S., 1989. "International Transmission of Stock-Market Movements", *Journal of Financial and Quantitative Analysis*, vol. 24, no. 2, pp. 241-256.

Fama, E. F., 1965. "The Behavior of Stock-Market Prices", *Journal of Business*, vol. 38, no. 1, pp. 34-105.

Fama, E. F. and French, K. R., 1992. "The Cross-Section of Expected Stock Returns", *Journal of Finance*, vol. 47, no. 2, pp. 427-465.

Fama, E. F. and French, K. R., 1993. "Common Risk Factors in the Returns on Stock and Bonds", *Journal of Financial Economics*, vol. 33, no. 1, pp. 3-56.

Fama, E. F. and French, K. R., 1996. "Multifactor Explanations of Asset Pricing Anomalies", *Journal of Finance*, vol. 51, no. 1, pp. 55-84.

Fama, E. F. and French, K. R., 1998. "Value Versus Growth: The International Evidence", *Journal of Finance*, vol. 53, no. 6, pp. 1975-1999.

Fama, E. F. and MacBeth, J. D., 1973. "Risk, Return, and Equilibrium: Empirical Tests", *Journal of Political Economy*, vol. 81, no. 3, pp. 607-636.

Ferson, W. E. and Harvey, C. R., 1993. "The Risk and Predictability of International Equity Returns", *Review of Financial Studies*, vol. 6, no. 3, pp. 527-566.

Ferson, W. E. and Harvey, C. R., 1993. "The Risk and Predictability of International Equity Returns", *Review of Financial Studies*, vol. 6, no. 3, pp. 527-566.

Ferson, W. E. and Harvey, C. R., 1994. "Sources of Risk and Expected Returns in Global Equity Markets", *Journal of Banking and Finance*, vol. 18, no. 4, pp. 775-803.

Fisher, L., 1966. "Some New Stock Market Indices", *Journal of Business*, vol. 39, pp. 191-225.

Forbes, K. J. and Rigobon, R., 2002. "No Contagion, Only Interdependence: Measuring Stock Market Comovements", *Journal of Finance*, vol. 57, no. 5, pp. 2223-2261.

French, K. R. and Poterba, J. M., 1991. "Investor Diversification and International Equity Markets", *American Economic Review*, vol. 81, no. 2, pp. 222-226.

French, K. R., Schwert, G. W. and Stambaugh, R. F., 1987. "Expected Stock Returns and Volatility", *Journal of Financial Economics*, vol. 19, no. 1, pp. 3-29.

Froot, K. A. and Rogoff, K., 1995. "Perspectives on Ppp and Long-Run Real Exchange Rates", in Grossman, G. M. and Rogoff, K. eds., *Handbook of International Economics Volume 3*, Elsevier, North-Holland, Handbooks in Economics, vol. 3. Amsterdam; New York and Oxford, pp. 1647-1688.

FTSE, 2003. "Ftse Global Classification System 2003 Handbook", [Online], Available: http://www.ftse.com/indices_marketdata/classification_handbook2003.pdf, [July 23].

FTSE, 2003. "Ftse Global Classification System - Home", [Online], Available: http://www.ftse.com/indices_marketdata/global_classification/overview.jsp, [July 3].

FTSE, 2003. "Ground Rules for the Management of the Ftse All-World Index", [Online], Available: http://www.ftse.com/indices_marketdata/ground_rules/allworld-ground-rules.pdf, [July 3].

Gaumnitz, J. F., 1971. "The Influence of Industry Factors in Stock Prices Movements", working paper, no. 43.

Greene, W. H., 2003. *Econometric Analysis*, 5th edn, Prentice Hall, Upper Saddle River, N.J.

Griffin, J. M. and Karolyi, G. A., 1998. "Another Look at the Role of the Industrial Structure of Markets for International Diversification Strategies", *Journal of Financial Economics*, vol. 50, no. 3, pp. 351-373.

Griffin, J. M. and Stulz, R. M., 2001. "International Competition and Exchange Rate Shocks: A Cross- Country Industry Analysis of Stock Returns", *Review of Financial Studies*, vol. 14, no. 1, pp. 215-241.

Griffiths, W. E., Hill, R. C. and Judge, G. G., 1993. *Learning and Practicing Econometrics*, Wiley, New York.

Grinblatt, M. and Titman, S., 1983. "Factor Pricing in a Finite Economy", *Journal of Financial Economics*, vol. 12, no. 4, pp. 497-507.

Grinold, R., Rudd, A. and Stefek, D., 1989. "Global Factors: Fact or Fiction?" *Journal of Portfolio Management*, vol. 16, no. 1, pp. 79-88.

Grubel, H. G., 1968. "Internationally Diversified Portfolios: Welfare Gains and Capital Flows", *American Economic Review*, vol. 58, no. 4, pp. 1299-1314.

Gultekin, M. N., Gultekin, N. B. and Penati, A., 1989. "Capital Controls and International Capital Market Segmentation: The Evidence from the Japanese and American Stock Markets", *Journal of Finance*, vol. 44, no. 4, pp. 849-869.

Hansen, L. P., 1982. "Large Sample Properties of Generalized Method of Moments Estimatiors", *Econometrica*, vol. 50, pp. 1029-1054.

Harvey, C. R., 1991. "The World Price of Covariance Risk", *Journal of Finance*, vol. 46, no. 1, pp. 111-157.

Harvey, C. R., 1995. "The Cross-Section of Volatility and Autocorrelation in Emerging Markets", *Finanzmarkt und Portfolio Management*, no. 9, pp. 12-34.

Harvey, C. R., 1995. "Predictable Risk and Returns in Emerging Markets", *Review of Financial Studies*, vol. 8, no. 3, pp. 773-816.

Harvey, C. R. and Bekaert, G., 2002. "Country Risk Analysis: A Chronology of Important Financial, Economic and Political Events in Emerging Markets", [Online], Available: http://www.duke.edu/~charvey/Country_risk/couindex.htm, [July 30].

Häusler, G., 2002. "The Globalization of Finance", *International Monetary Fund*, [Online], Available: http://www.imf.org/external/pubs/ft/fandd/2002/03/index.htm, [July 2003].

Hawawini, G., 1980. "The Intertemporal Cross Price Behavior of Common Stocks: Evidence and Implications", *Journal of Financial Research*, vol. 3, no. 153-167.

Heaney, R. and Hooper, V., 1999. "World, Regional Adn Political Risk Influences Upon Aisa Pacific Equity Market Returns", *Australian Journal of Management*, vol. 24, no. 2, pp. 131-142.

Heaney, R. and Hooper, V., 2001. "Regionalism, Political Risk and Capital Market Segmentation in International Asset Pricing", *Journal of Economic Integration*, vol. 16, no. 3, pp. 299-312.

Heathcote, J. and Perri, F., 2002. "Financial Globalization and Real Regionalization", working paper, no. 9292.

Henry, P. B., 2000. "Stock Market Liberalization, Economic Reform, and Emerging Market Equity Prices", *Journal of Finance,*, vol. 55, no. 2, pp. 529-564.

Heston, S. L. and Rouwenhorst, K. G., 1994. "Does Industrial-Structure Explain the Benefits of International Diversification", *Journal of Financial Economics*, vol. 36, no. 1, pp. 3-27.

Heston, S. L. and Rouwenhorst, K. G., 1995. "Industry and Country Effects in International Stock Returns - Implications for Asset Allocation", *Journal of Portfolio Management*, vol. 21, no. 3, pp. 53-58.

Heston, S. L., Rouwenhorst, K. G. and Wessels, R. E., 1999. "The Role of Beta and Size in the Cross-Section of European Stock Returns", *European Financial Management*, vol. 5, no. 1, pp. 9-27.

Huberman, G., 1982. "A Simple Approach to Arbitrage Pricing Theory", *Journal of Economic Theory*, vol. 28, no. 1, pp. 183-191.

Ingersoll, J. E., Jr., 1984. "Some Results in the Theory of Arbitrage Pricing", *Journal of Finance*, vol. 39, no. 4, pp. 1021-1039.

Kang, J. K. and Stulz, R. M., 1997. "Why Is There a Home Bias? An Analysis of Foreign Portfolio Equity Ownership in Japan", *Journal of Financial Economics*, vol. 46, no. 1, pp. 3-28.

Kennedy, P., 1986. "Interpreting Dummy Variables", *Review of Economics and Statistics*, vol. 68, no. 1, pp. 174-175.

Kim, E. H. and Singal, V., 2000. "Stock Market Openings: Experience of Emerging Economies", *Journal of Business*, vol. 73, no. 1, pp. 25-66.

King, B. F., 1966. "Market and Industry Factors in Stock Price Behavior", *Journal of Business*, vol. 39, no. 1, pp. 139-190.

King, M., Sentana, E. and Wadhwani, S., 1994. "Volatility and Links between National Stock Markets", *Econometrica*, vol. 62, no. 4, pp. 901-933.

Korajczyk, R. A. and Viallet, C. J., 1989. "An Empirical Foundations of the Arbitrage Pricing Theory", *Review of Financial Studies*, vol. 2, pp. 553-586.

Kuo, W. and Satchell, S. E., 2001. "Global Equity Styles and Industry Effects: The Pre-Eminence of Value Relative to Size", *Journal of International Financial Markets, Institutions and Money*, vol. 11, no. 1, pp. 1-28.

Lessard, D. R., 1973. "International Portfolio Diversification: A Multivariate Analysis for a Group of Latin American Countries", *Journal of Finance*, vol. 28, no. 3, pp. 619-633.

Lessard, D. R., 1974. "World, National, and Industry Factors in Equity Returns", *Journal of Finance*, vol. 29, no. 2, pp. 379-391.

Levy, H. and Sarnat, M., 1970. "International Diversification of Investment Portfolios", *American Economic Review*, vol. 60, no. 4, pp. 668-675.

Lewis, K. K., 1999. "Trying to Explain Home Bias in Equities and Consumption", *Journal of Economic Literature*, vol. 37, no. 2, pp. 571-608.

L'Her, J. F., Sy, O. and Tnani, M. Y., 2002. "Country, Industry, and Risk Factor Loadings in Portfolio Management - Country Effects Declining in Importance; Industry Effects Growing", *Journal of Portfolio Management*, vol. 28, no. 4, pp. 70-79.

Lintner, J., 1965. "The Valuation of Risk Assets and the Selection of Risky Investments in Stock Portfolios and Capital Budgets", *Review of Economics and Statistics*, vol. 47, pp. 12-37.

Longin, F. and Solnik, B., 1995. "Is the Correlation in International Equity Returns Constant: 1960-1990?" *Journal of International Money and Finance*, vol. 14, no. 1, pp. 3-26.

Longin, F. and Solnik, B., 2001. "Extreme Correlation of International Equity Markets", *Journal of Finance*, vol. 56, no. 2, pp. 649-676.

Markowitz, H. M., 1952. "Portfolio Selection", *Journal of Finance*, vol. 7, pp. 77-91.

McDonald, J. G., 1973. "French Mutual Fund Performance: Evaluation of Internationally-Diversified Portfolios", *Journal of Finance*, vol. 28, no. 5, pp. 1161-1180.

Meyers, S. L., 1973. "A Re-Examination of Market and Industry Factors in Stock Price Behavior", *Journal of Finance*, vol. 28, no. 3, pp. 695-705.

Moore, A., 1964. "Some Characteristics of Changes in Common Stock Prices", in Cootner, P. H. ed., *The Random Character of Stock Market Prices*, M.I.T. Press, Cambridge, Mass., pp. 412-474.

Moskowitz, T. J. and Grinblatt, M., 1999. "Do Industries Explain Momentum?" *Journal of Finance*, vol. 54, no. 4, pp. 1249-1290.

Murphy, J. E. and Stevenson, H., 1967. "Price Earnings Ratios and Future Growth of Earnings and Dividends", *Financial Analysts Journal*, no. November-December, pp. 111-114.

Nelson, D. B., 1991. "Conditional Heteroskedasticity in Asset Returns: A New Approach", *Econometrica*, vol. 59, no. 2, pp. 347-370.

Newey, W. K. and West, K. D., 1987. "Hypothesis Testing with Efficient Method of Moments Estimation", *International Economic Review*, vol. 28, no. 3, pp. 777-787.

Odier, P. and Solnik, B. H., 1993. "Lessons for International Asset Allocation, Financial Analysts", *Financial Analysits Journal*, vol. 49, no. 2, pp. 63-77.

Omae, K., 1985. *Triad Power: The Coming Shape of Global Competition*, Free Press, New York.

Paisley, E., 1990. "Share and Share Alike: Regional Bourses Plan Greater Coopreation", *Far Eastern Economic Review*, vol. 150, no. 52, pp. 32.

Reilly, F. K. and Drzycimski, E. F., 1974. "Alternative Industry Performance and Risk", *Journal of Financial and Quantitative Analysis*, vol. 9, no. 3, pp. 423-446.

Richardson, M. and Smith, T., 1993. "A Test for Multivariate Normality in Stock Returns", *Journal of Business*, vol. 66, no. 2, pp. 295-321.

Roll, R., 1992. "Industrial Structure and the Comparative Behavior of International Stock Market Indices", *Journal of Finance*, vol. 47, no. 1, pp. 3-41.

Ross, S. A., 1976. "The Arbitrage Theory of Capital Asset Pricing", *Journal of Economic Theory*, vol. 13, no. 3, pp. 341-360.

Ross, S. A., 1989. "Information and Volatility: The No-Arbitrage Martingale Approach to Timing and Resolution Irrelevancy", *Journal of Finance*, vol. 44, no. 1, pp. 1-17.

Ross, S. A. and Walsh, M., 1983. "A Simple Approach to the Pricing of Risky Assets with Uncertain Exchange Rates", in Hawkins, R., Levich, R. and Wihlborg, C. eds., *The Internationalization of Financial Markets and National Economic Policy*, JAI Press, Greenwich, C.T.

Rouwenhorst, K. G., 1999. "European Equity Markets and the Emu", *Financial Analysts Journal*, vol. 55, no. 3, pp. 57-64.

Rouwenhorst, K. G., 1999. "Local Return Factors and Turnover in Emerging Stock Markets", *Journal of Finance*, vol. 54, no. 4, pp. 1439-1464.

Schwert, G. W., 1990. "Stock Volatility and the Crash of '87", *Review of Financial Studies*, vol. 3, no. 1, pp. 77-102.

Sercu, P., 1980. "A Generalization of the International Asset Pricing Model", *Finance*, vol. 1, no. 1, pp. 91–135.

Serra, A. P., 2000. "Country and Industry Factors in Returns: Evidence from Emerging Markets' Stocks", *Emerging Markets Review*, vol. 1, no. 2, pp. 127-151.

Sharpe, W. F., 1963. "A Simplified Model for Portfolio Analysis", *Management Science*, vol. 9, pp. 277-293.

Sharpe, W. F., 1964. "Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk", *Journal of Finance*, vol. 19, pp. 425-442.

Solnik, B., 1983. "International Arbitrage Pricing Theory", *Journal of Finance*, vol. 38, no. 2, pp. 449-457.

Solnik, B. H., 1974. "An Equilibrium Model of the International Capital Market", *Journal of Economic Theory*, vol. 8, no. 4, pp. 500-524.

Solnik, B. H., 1974. "Why Not Diversify Internationally Rather Than Domestically?" *Financial Analysts Journal*, vol. 30, no. 4, pp. 48-54.

Solnik, B. H., 1993. "The Performance of International Strategies Using Conditioning Information", *Journal of Empirical Finance*, vol. 1, no. 1, pp. 33-56.

Stambaugh, R. F., 1986. "Arbitrage Pricing with Information", *Journal of Financial Economics*, vol. 12, no. 3, pp. 347-368.

Stulz, R. M., 1981. "A Model of International Asset Pricing", *Journal of Financial Economics*, vol. 9, no. 4, pp. 383-406.

Stulz, R. M., 1981. "On the Effects of Barriers to International Investment", *Journal of Finance*, vol. 36, no. 4, pp. 923-934.

Stulz, R. M., 1995. "The Cost of Capital in Internationally Integrated Markets: The Case of Nestle", *European Financial Management*, vol. 1, no. 1, pp. 11-22.

Stulz, R. M., 1995. "International Portfolio Choice and Asset Pricing: An Integrative Survey", in Jarrow, R. A., Maksimovic, V. and Ziemba, W. T. eds., *Finance*, Handbooks in Operations Research and Management Science, vol. 9, Elsevier, Amsterdam.

Sudweeks, B. L., 1989. *Equity Market Development in Developing Countries*, Praeger, New York.

Suits, D. B., 1984. "Dummy Variables: Mechanics V. Interpretation", *Review of Economics and Statistics*, vol. 66, no. 1, pp. 177-180.

Tesar, L. L. and Werner, I. M., 1995. "Home Bias and High Turnover", *Journal of International Money and Finance*, vol. 14, no. 4, pp. 467-492.

Tobin, J., 1958. "Liquidity Preference as Behavior toward Risk", *Review of Economic Studies*, vol. 25, pp. 65-86.

Tsay, R. S., 1986. "Time Series Model Specification in the Presence of Outliers", *Journal of the American Statistical Association*, vol. 81, no. 393, pp. 132-141.

Tysseland, M. S., 1971. "Further Tests of the Validity of the Industry Approach to Investment Analysis", *Journal of Financial and Quantitative Analysis*, vol. 6, no. 2, pp. 835-847.

Weiss, R. A., 1998. "Global Sector Rotation: New Look at an Old Idea", *Financial Analysts Journal*, vol. 54, no. 3, pp. 6-8.

APPENDICES

APPENDIX A

Appendices to Chapter III

Appendix A.1

Calculation of Industry Concentration Ratio

As suggested in existing studies, there are two commonly employed indices to measure the concentration phenomenon within an industry or a stock market: Concentration Ratio and Herfindahl-Hirschman Concentration Index (HCI).

A. Concentration Ratio (CR)

The concentration ratio is the percentage of market share[80] owned by the largest m firms in an industry, where m is a specified number of firms. Accordingly, the concentration ratio often is expressed as CR_m. It is computed as:

$$CR_m = \sum_{i=1}^{m} s_i \ ,$$

where, s_i is the market share of ith largest firm.[81] If the CR_m were close to zero, it indicates an extremely competitive industry since the top m firms do not have any significant market share.

However, the concentration ratio also has its weaknesses. It presents an incomplete picture of the concentration of firms in an industry because: (1) By definition, it does not use the market shares of all the firms in the industry. (2) Such a measure also does not provide information about the distribution of firm size. For example, if there were a significant change in the market shares among the firms included in the ratio, the value of the concentration ratio would not change.

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[80] Market share is computed as follows: Market Share = Firm's Sales / Total Market Sales.

[81] Similar measure can be used with its ratio computed as those listed stocks (ranked by their market capitalization) with a total market capitalization above an arbitrary selected threshold, say, 10%, to the total market capitalization of all listed stocks in a given market.

In his examination of cross-sectional volatility and autocorrelation in emerging markets, Harvey (1995) has suggested another measure of concentration ratio:

$$CR_m = \sqrt{\frac{N}{N-1}\sum_{i=1}^{N}\left(\omega_i - 1/N\right)^2} \ ,$$

where, N is the number of stocks in a given national stock market index m and ω_i is the weight of asset i in the total market capitalization. Hence, if each stock has equal weights (1/N), then the concentration ratio would equal zero. However, the cross-sectional list of constituent companies of national stock market indices is not available to this study. Therefore, this measure will not be used.

B. Herfindahl-Hirschman Concentration Index

Unlike the concentration ratio measure, the Herfindahl-Hirschman Concentration Index (HCI) provides a more complete picture of the concentration phenomenon in an industry. The HCI uses the market shares of *all* the firms in an industry, and these market shares are squared in the calculation to place more weight on the larger firms. If there are n firms in the industry, the HCI can be computed as:

$$HCI_n = \sum_{i=1}^{n} s_i^2 \ ,$$

where, s_i is the market share of the ith firm.

The HCI will change if there is a significant shift in market share among the larger firms. Thus, this measure is widely used by government regulatory bodies as well as academics to compute industry concentration in a given industry. For example, The U.S. Department of Justice has used the HCI as yardsticks for evaluating the effects of mergers on the competitiveness in a given industry. Like CR, small values of HCI imply a competitive industry, while large values imply that the industry is high concentrated.

Appendix A.2

Proposed Models to Extract Regional Factor

By intuition, an industry return ($R_{j,k,l}$) is assumed belong to industry *j*, country *k* and region *l*, can be decomposed into five orthogonal components: A global market factor (α), a global industry factor (β), a country factor (γ), a regional factor (δ), and an idiosyncratic factor (e) specific to that industry in country *k* and region *l*:

$$R_{j,k,l,t} = \alpha_t + \beta_{j,t} + \gamma_{k,t} + \delta_{l,t} + e_{j,k,l,t} \quad . \qquad \text{(A.2.1)}$$

Then, a dummy variable regression model in the sprite of Heston and Rouwenhorst (1994) can be specified with the explicit consideration for the regional factor as follows:

$$R_{j,k,l,t} = \alpha_t + \sum_{j=1}^{J} \beta_{j,t} I_{j,t} + \sum_{k=1}^{K} \gamma_{k,t} C_{k,t} + \sum_{l=1}^{L} \delta_{l,t} A_{l,t} + e_{j,k,l,t} \quad , \qquad \text{(A.2.2)}$$

where, I_j is an industry dummy that is equal to one if the industry return belongs to industry *j* and zero otherwise; C_k is a country dummy that is equal to one if the industry return belongs to country *k* and zero otherwise; and, A_l is a regional dummy that is equal to one if the industry return belongs to region *l* and zero otherwise.

Since only cap-weighted industry returns are available for examination in this thesis, Equation A2.2 can be run cross-sectionally using the weighted linear squares (WLS), subject to the following set of constraints (refer to Chapter 3 for further information):

$$\sum_{j=1}^{J} \omega_{j,t-1} \beta_{j,t} = 0 \quad , \qquad \text{(A.2.3)}$$

$$\sum_{k=1}^{K} \omega_{k,t-1} \gamma_{k,t-1} = 0 \quad ,$$

$$\sum_{l=1}^{L} \omega_{l,\,t-1}\delta_{l,\,t} = 0 \quad ,$$

and,

$$\sum\nolimits_k \omega_{k,\,t-1} = \sum\nolimits_j \omega_{j,\,t-1} = \sum\nolimits_l \omega_{l,\,t-1} = 1 \quad ,$$

where, $\omega_{j,\,t-1}$, $\omega_{k,\,t-1}$, and $\omega_{l,\,t-1}$ are the weights computed from aggregate market capitalization of global industry j, country k, and region l at the beginning of a holding period from t - 1 to t.

Unfortunately, the estimated factor loadings for the regional dummies in Equation A2.2 are all zeros, meanwhile the factor loadings for industry and country factors are exactly the same as those estimated from a model without explicit incorporation with regional effect.[82] One of the possible reasons for this indeterminacy can be offered as follows. Unlike the industry and country dummies, which is industry- and country-specific for a given industry return on ten (broad) FTSE Economic Groups and 39 (refined) FTSE Industry Sectors, the regional dummy set is an aggregate representative of all countries in a region. Hence, when combined with country dummies, there may exist some "masking" effect. That is, a refined classification, such as country dummies, has masked a broader classification—the regional dummies, by categorizing country dummies into regional dummies.

Facing the possible misspecification of the above model, an alternative is offered focusing on the pure country returns as estimated from the dummy variable regression model of Heston and Rouwenhorst (1994), with the assumption that they may contain the variations due to their respective regional factors. The industry returns are assumed to be decomposed into its four components as:

$$R_{j,\,k,\,t} = \alpha_t + \beta_{j,\,t} + \gamma_{k,\,t} + e_{j,\,k,\,t} \qquad \text{(A.2.4)}$$

---

[82] Same estimation results are obtained when the sample markets are classified according to their stages of economic development and maturities of markets, i.e., developed markets, advanced emerging markets, and emerging markets.

The country factor, γ, and the disturbance term, e from Equation A2.4, are conjectured as being confounded with regional effects. Therefore, in a second stage, the sum of the estimates of country factor and disturbance term, i.e., $\hat{\gamma}_{k,t} + \hat{e}_{j,k,t}$ from Equation A.2.4 in the first stage are used to estimate the regional and country factors in the following dummy model specification for each sector:[83]

$$\hat{\gamma}_{k,t} + \hat{e}_{j,k,t} = \alpha_t^* + \sum_{k=1}^{K} \gamma_{k,t} C_{k,t} + \sum_{l=1}^{L} \delta_{l,t} A_{l,t} + e_{j,k,l,t} \qquad \text{(A.2.5)}$$

The above model is also subject to the same set of constraints as in Equation A.2.3.

When estimating this model cross-sectional, the statistical software, both WinRATS 5.0 and S-PLUS 6.0, reports that the model is misspecified. This result confirms the suspicion that the masking effect does exist between two sets of dummies, i.e., country and regional dummy sets.

In order to address the masking effect, the third model based on the two-stage regression is offered. In the first stage, each industry return is assumed to be decomposable into three components: A world benchmark portfolio, a regional effect, and a disturbance, or a "macro" approach:

$$R_{j,k,l,t} = \alpha_t + \delta_{l,t} + e_{j,k,l,t} \qquad \text{(A.2.6)}$$

Then, in the second stage, error terms in Equation A2.6 are decomposed as follows, or a "micro" approach:

$$\hat{e}_{j,k,l,t} = \alpha_t^* + \beta_{j,t} + \gamma_{k,t} + e_{j,k,l,t}^* \qquad \text{(A.2.7)}$$

[83] The asterisk is used to indicate that the intercept is estimated in the second stage of the extended dummy variable regression model.

This model specification has two severe weaknesses. First, in the first stage, Equation A2.6, the regional factor may be intermingled with country and industry factors that have not been explicitly controlled. Therefore, the regional factor may have presumed so many other factors that it is not "pure" in the sense of Heston and Rouwenhorst (1994). Secondly, in the second stage, the intercept term in Equation A2.7 is difficult to interpret. Such a difficulty comes from the fact that in the first stage, α_t is assumed representative of the benchmark performance of a world market portfolio; hence, in the second stage, the intercept term in Equation A2.7 must be suppressed because the global effect other than industries has been taken away in the first stage via α_t. However, as suggested in Suits (1984) and Kennedy (1986), it is necessary to keep the intercept term in Equation A.2.7, from which factor loadings for industry, country, and regional factors can be recovered.

Through above discussion, it is conjectured that an appropriate approach to decomposing a market return into its industry, country and regional components should follow a leaf-to-stem strategy. In other words, if industry returns are assumed as leaves and market returns as stems, an appropriate approach should estimate the industry factor first, i.e., from "leaves"; for the aggregate factors, such as country and regional factors, they should be estimated from "stems." Therefore, Section 3.3 of Chapter 3 has proposed an extended two-stage dummy variable regression model to decompose a given cross-sectional market return into its industry, country, and regional components. Justifications for such a choice are also offered therein.

APPENDIX B

Appendices to Chapter IV

Appendix B.1

Industry Classification (down to Two Digits) by FTSE Economic Group/FTSE Industry Sector as Provided in FTSE All-World Index Series$^{TM/SM}$ (2001 - 2003)

This table shows the industry classification system (the FTSE Global Classification System, down to 2 digits) used by FTSE All-World Index Series$^{TM/SM}$ to group its universe of stocks into ten broad FTSE Economic Groups and 36 finer FTSE Industry Sectors during the period 2001-2003. "Mnem" stands for mnemonics for each Economic Group and Industry Sector, which is used throughout this thesis.

FTSE Economic Group		FTSE Industry Sector			Notes
		2003 Version	Early Version	Mnem	
Name	Mnem	Name	Name		
Resource	eRS	Mining	Mining	iMN	
		Oil & Gas	Oil & Gas	iOG	
Basic Industries	eBI	Chemicals	Chemicals	iCH	
		Construction & Building Materials	Construction & Building Materials	iCB	
		Forestry & Paper Products	Forestry & Paper Products	iFP	
		Steel & Other Metals	Steel & Other Metals	iSM	
General Industries	eGI	Aerospace & Defence	Aerospace & Defence	iAD	
		Diversified Industrials	Diversified Industrials	iDI	
		Electronic & Electrical Equipment	Electronic & Electrical Equipment	iEE	
		Engineering & Machinery	Engineering & Machinery	iEM	
Cyclical Consumer Goods	eCG	Automobiles and Parts	Automobiles and Parts	iAU	
		Household Goods & Textiles	Household Goods & Textiles	iHG	
Non-Cyclical Consumer Goods	eNC	Beverages	Beverages	iBV	
		Food Producers & Processors	Food Producers & Processors	iFO	
		Health	Health	iHL	
			Packaging	iPK	Discontinues on December 31, 2001
		Personal Care & Household Products	Personal Care & Household Products	iPC	
		Pharmaceuticals	Pharmaceuticals	iPH	
		Tobacco	Tobacco	iTO	
Cyclical Services	eCS		Distributors	iDS	Discontinues on December 31, 2001
		General Retailers	General Retailers	iGR	
		Leisure, Entertainment & Hotels	Leisure, Entertainment & Hotels	iLE	
		Media & Photography	Media & Photography	iMP	
		Support Services	Support Services	iSS	
		Transport	Transport	iTR	
Non-Cyclical Services	eNS	Food & Drug Retailers	Food & Drug Retailers	iFD	
		Telecommunication Services	Telecommunication Services	iTS	
Utilities	eUT	Electricity	Electricity	iEL	
			Gas Distribution	iGD	Discontinues on December 31, 2002
			Water	iWT	Discontinues on December 31, 2002
		Utilities, Others		iUO	Available since January 1, 2003
Financials	eFI	Banks	Banks	iBK	
		Insurance	Insurance	iIN	
		Life Assurance	Life Assurance	iLA	
		Investment Companies	Investment Companies	iIC	
		Real Estate	Real Estate	iRE	
		Speciality & Other Finance	Speciality & Other Finance	iSF	
Information Technology	eIT	Information Technology Hardware	Information Technology Hardware	iIH	
		Software & Computer Services	Software & Computer Services	iSC	

Appendix B.2

All National Stock Markets Included in FTSE All-World Index Series$^{TM/SM}$

This table shows all national (stock) markets included in the FTSE All-World Index Series$^{TM/SM}$ product available for downloading from Datastream International. The national markets are grouped according to their geographical location and further divided into developed and emerging market sub-group accordingly.

Europe		*Middle East and Africa*	*Asia Pacific*		*North America*	*Latin America*
Developed	Emerging	Emerging	Developed	Emerging	Developed	Emerging
Belgium/Luxembourg	Czech Republic	Morocco	Japan	China	Canada	Argentina
Denmark	Hungary	Egypt	Australia	India	USA	Brazil
Finland	Poland	Israel	New Zealand	Indonesia		Chile
France	Russia	South Africa	Hong Kong	Korea		Colombia
Germany	Turkey		Singapore	Malaysia		Mexico
Greece				Pakistan		Peru
Ireland				Philippines		
Italy				Thailand		
Netherlands				Taiwan		
Norway						
Austria						
Portugal						
Spain						
Sweden						
Switzerland						
UK						

Source: FTSE, 2003. "FTSE All-World Review: Summary of Changes Taking Place in September 2003", [Online], Available: http://www.ftseall-world.com/Docs/FTSEAllWorldReviewSeptemberchanges.pdf, [September 30, 2003], p. 1.

Appendix B.3

Selected Stock Markets in This Thesis

This table shows 33 major stock markets handpicked for this thesis. The sample markets are first grouped into Developed Stock Markets and Emerging Stock Markets, i.e., 1st Level (Group); then, for constituent market in each "Group," they are further divided into several "Sub-groups" according to either the advancedness of their domicile countries' economy, e.g., G7 sub-group, or geographical location, e.g., Asia. "Mnem" stands for mnemonics for each market, which are used throughout this thesis.

Group		Country	
1st Level (Group)	2nd Level (Sub-group)	Name	Mnem
Developed Stock Markets	*G7*	Canada	cCN
		United States	cUS
		France	cFR
		Germany	cBD
		United Kingdom	cUK
		Italy	cIT
		Japan	cJP
	Asia/Australasia	Australia	cAU
		New Zealand	cNZ
		Hong Kong/China	cHK
		Singapore	cSG
Eemerging Stock Markets	*Advanced*	Brazil	cBR
		Mexico	cMX
		Israel	cIS
		Korea	cKR
		Taiwan/China	cTA
		South Africa	cSA
	Asia	India	cIN
		Pakistan	cPK
		China	cCI
		Indonesia	cID
		Malaysia	cMA
		Philippines	cPH
		Thailand	cTH
	Europe	Czech Republic	cCR
		Hungary	cHG
		Poland	cPL
		Turkey	cTU
		Russia	cRU
	Lat. America	Argentina	cAG
		Chile	cCH
		Colombia	cCO
		Peru	cPE

Appendix B.4

Industrial Composition by Number of Equities for Each Sample National Stock Market (January 1994 - June 2003)

This table presents the industry composition by 39 FTSE Industry Sectors, proxied by time series average number of equities (NE), of 33 sample national stock markets from the FTSE All-World Index Series$^{TM/SM}$ from January 12, 1994 through June 25, 2003. Note that (1) for all of Developed Stock Markets (DSM) group and some of Emerging Stock Market (ESM) group of countries (both marked by *), the NE measure is not available for examination till the week begins on July 3, 2001. Hence, NE measures represent the latest industry composition in these affected countries. (2) There seems a significant decrease of the NE measure for some ESM group countries before and during the time when DSM countries are first added to the sample on July 3, 2001 (see Appendix B.6 for a group of time series plots for NE data for each national stock market during the full sample period). "Sub-Group Sum" measures are reported for each sub-group and "All Sample Countries Sum" measures are also reported for all sample countries.

Group	Sub-group	Country	Resource		Basic Industries				General Industries				Cyclical Consumer Goods		Non-Cyclical Consumer Goods							Cyclical Services						Non-Cyclical Services		Utilities				Financials						Information Technology		All Sample Contries Sum
			iMN	iOG	iCH	iCB	iFP	iSM	iAD	iDI	iEE	iEM	iAU	iHG	iBV	iFO	iHL	iPK [1]	iPC	iPH	iTO	iDS [1]	iGR	iLE	iMP	iSS	iTR	iFD	iTS	iEL	iGD [2]	iWT [2]	iUO [3]	iBK	iIN	iLA	iIC	iRE	iSF	iIH	iSC	
DSM	G7	Canada*	7	9	4	-	4	4	-	-	2	3	2	-	1	2	1	-	-	2	-	-	2	2	6	-	3	2	4	1	-	-	4	6	2	4	-	2	2	3	2	86
		United States*	1	21	14	3	7	3	9	7	11	9	7	11	5	12	23	-	7	20	2	-	25	12	25	14	5	7	12	28	-	-	4	29	17	7	1	4	26	40	19	447
		France*	-	1	1	4	-	2	2	1	2	-	4	2	1	1	1	-	1	2	-	-	1	1	3	2	-	2	2	-	-	-	2	3	2	-	-	-	-	2	1	46
		Germany*	-	-	4	1	-	-	-	2	1	2	4	1	-	-	1	-	3	3	-	-	2	1	-	1	1	-	1	-	-	-	2	3	4	-	-	-	-	1	1	39
		United Kingdom*	4	3	3	4	-	1	3	-	1	1	1	-	4	4	2	-	1	3	3	-	8	6	12	10	5	3	4	3	-	-	5	9	1	4	6	4	5	1	3	127
		Italy*	-	2	-	1	-	-	1	3	-	-	1	2	-	1	1	-	-	-	-	-	-	-	4	-	-	-	4	1	-	-	1	10	3	2	-	-	3	-	-	40
		Japan*	-	6	26	22	2	13	-	6	32	15	17	14	4	12	1	-	4	17	1	-	12	2	8	2	22	3	4	9	-	-	2	20	5	-	-	3	14	13	10	321
		Sub-Group Sum	*12*	*42*	*52*	*35*	*13*	*23*	*15*	*19*	*49*	*30*	*36*	*30*	*15*	*32*	*30*	-	*16*	*47*	*6*	-	*50*	*24*	*58*	*29*	*36*	*17*	*31*	*42*	-	-	*20*	*80*	*34*	*17*	*7*	*13*	*50*	*60*	*36*	*1106*
	Asia/ Australasia	Australia*	6	3	1	3	-	1	-	3	-	-	-	-	4	1	2	-	-	1	-	-	2	1	5	3	4	2	1	-	-	-	1	7	2	2	1	8	1	-	-	65
		New Zealand*	-	-	-	1	3	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	2	1	2	-	6	-	1	1	-	-	1	1	-	-	-	1	1	-	-	23
		Hong Kong/China*	-	1	-	1	-	-	-	11	1	-	1	2	-	1	-	-	-	-	-	-	1	2	2	-	5	1	3	2	-	-	1	3	-	-	-	13	1	1	-	53
		Singapore*	-	-	-	-	-	1	1	2	1	3	1	-	1	1	1	-	-	-	-	-	-	2	1	-	4	-	2	-	-	-	-	3	-	1	1	8	-	5	-	39
		Sub-Group Sum	*6*	*4*	*1*	*5*	*3*	*2*	*1*	*16*	*2*	*3*	*2*	*3*	*5*	*4*	*3*	-	-	*1*	-	-	*5*	*6*	*10*	*3*	*19*	*3*	*7*	*3*	-	-	*3*	*14*	*2*	*3*	*2*	*30*	*3*	*6*	-	*180*
ESM	Advanced	Brazil*	2	2	-	-	2	4	2	1	-	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	-	1	14	5	-	-	-	3	-	-	-	-	-	-	-	39
		Mexico*	1	-	-	2	-	-	-	2	-	-	-	-	3	1	-	-	-	-	-	-	2	-	2	-	-	-	4	-	-	-	-	2	-	-	-	-	-	-	-	19
		Israel	-	-	3	3	-	-	1	5	1	-	1	1	-	2	-	-	-	2	-	-	1	-	1	-	-	2	2	-	-	-	-	7	3	-	-	-	-	1	2	38
		Korea	-	3	1	2	-	1	-	1	4	3	3	2	-	1	-	-	-	-	1	-	2	-	-	1	1	-	4	1	-	-	1	6	1	-	-	-	7	1	-	47
		Taiwan	-	-	7	3	1	4	-	-	11	2	6	9	-	1	1	-	-	-	-	-	1	-	2	-	6	-	3	-	-	-	-	9	-	-	-	1	18	53	-	138
		South Africa*	8	1	-	-	1	1	-	2	1	-	-	1	-	3	-	-	-	-	-	-	4	-	2	2	-	2	2	-	-	-	-	5	-	4	2	-	2	-	1	44
		Sub-Group Sum	*11*	*6*	*11*	*10*	*4*	*10*	*3*	*11*	*17*	*5*	*10*	*13*	*5*	*8*	*1*	-	-	*2*	*2*	-	*10*	-	*7*	*3*	*7*	*5*	*29*	*6*	-	-	*1*	*32*	*4*	*4*	*2*	*1*	*27*	*55*	*3*	*325*
	Asia	India	-	2	3	3	-	2	1	1	1	3	2	-	-	2	-	-	2	6	-	-	-	-	1	-	1	-	2	2	-	-	1	5	-	-	-	-	3	-	6	49
		Pakistan	-	2	7	-	-	-	-	1	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	2	-	-	2	2	-	-	1	-	-	-	-	21
		China	-	3	5	1	1	3	-	-	4	1	2	5	1	1	-	-	-	1	-	-	-	-	-	-	11	-	1	6	-	-	-	-	-	-	-	3	-	1	1	51
		Indonesia	-	-	-	1	-	-	-	-	-	-	2	-	-	2	-	-	-	1	3	1	-	-	1	-	-	-	2	-	-	-	-	3	-	-	-	-	1	-	-	17
		Malaysia	-	-	-	7	-	-	-	-	1	-	4	-	-	7	-	-	-	-	1	-	-	5	-	-	5	-	2	2	-	-	4	7	-	-	-	-	2	2	-	49
		Philippines	-	1	-	-	-	-	-	2	-	-	-	-	2	-	-	-	-	-	-	-	-	-	1	-	-	-	1	2	-	-	-	3	-	-	-	4	-	-	-	16
		Thailand	1	2	3	5	-	-	-	-	1	-	-	-	-	2	-	-	-	-	-	-	1	1	-	-	1	-	3	2	-	-	-	6	-	-	-	1	5	3	-	37
		Sub-Group Sum	*1*	*10*	*18*	*17*	*1*	*5*	*1*	*4*	*7*	*4*	*10*	*7*	*3*	*14*	-	-	*2*	*8*	*4*	*1*	*1*	*6*	*3*	-	*19*	-	*12*	*16*	-	-	*7*	*26*	-	-	*1*	*8*	*11*	*6*	*7*	*240*
	Europe	Czech Republic	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	1	-	-	-	1	-	-	-	-	-	-	-	5
		Hungary	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	6
		Poland	-	1	-	1	1	2	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	1	-	-	-	-	4	-	-	-	-	1	-	2	16
		Turkey	-	1	-	4	-	1	-	4	1	-	2	4	1	-	-	-	-	-	-	-	1	-	1	-	-	-	1	1	-	-	1	4	1	-	1	-	-	1	-	30
		Russia	-	4	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	1	-	-	-	-	-	-	-	8
		Sub-Group Sum	-	*7*	*2*	*5*	*1*	*4*	-	*4*	*1*	-	*3*	*4*	*1*	-	-	-	-	*2*	-	-	*1*	*1*	*3*	-	-	-	*4*	*4*	-	-	*1*	*11*	*1*	-	*1*	-	*1*	*1*	*2*	*65*
	Lat. America	Argentina	-	1	2	-	-	2	-	-	-	-	1	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	1	3	-	-	-	1	-	-	-	15
		Chile	-	1	1	1	1	-	-	1	-	-	-	-	5	-	-	1	-	-	-	-	2	-	-	-	1	-	2	3	-	-	-	1	-	-	1	-	2	-	-	23
		Colombia	-	-	-	3	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	2	-	-	1	-	-	-	-	8
		Peru	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	1	-	-	-	-	-	-	-	5
		Sub-Group Sum	*1*	*2*	*3*	*5*	*1*	*2*	-	*1*	-	-	*1*	-	*5*	*3*	-	*1*	-	-	-	-	*3*	-	-	-	*1*	-	*3*	*6*	-	-	*1*	*7*	-	-	*2*	*1*	*2*	-	-	*51*
All Sample Countries Sum			31	71	87	77	23	46	20	55	76	42	62	57	34	61	34	1	18	60	12	1	70	37	81	35	82	25	86	77	-	-	33	170	41	24	15	53	94	128	48	1967

FTSE Economic Group

Notes: [1] Discontinues on December 31, 2001; [2] Discontinues on December 31, 2002; and, [3] Available since January 1, 2003.

Appendix B.5

Summary of Time Series Average Weights (in Percentage) for 39 FTSE Industry Sectors within Sample National Stock Markets (January 1994 – June 2003)

This table reports a summary of time series average weights (in percentage via market capitalization) for our 39 FTSE Industry Sectors within each of 33 sample national stock markets during the full sample period from January 5, 1994 through June 18, 2003. 39 FTSE Industry Sectors are classified according to FTSE Global Classification System, 2002/2003 versions on Datastream. Weekly (Wednesday-to-Wednesday) weights are calculated by using the beginning-of-the-week, U.S. dollar-denominated market capitalizations for constituent FTSE Industry Sectors in each sample market. Then, time series arithmetic averages are computed for each industry sector within the subject market, from the date when first observations are available for examination. As a consequence, the weights in each country presented in this table, in most cases, do *not* necessarily sum to one. The weights reported in "Sub-group Summary" and "All Sample Countries" rows are time series arithmetic averages obtained by averaging the sum of market capitalization of each industry sector across constituent countries within each group and all sample countries respectively.

Group	Sub-group	Country	FTSE Economic Group: Resources		Basic Industries				General Industries				Cyclical Consumer Goods		Non-Cyclical Consumer Goods						
			Mining	Oil & Gas	Chemicals	Construction & Building Materials	Forestry & Paper Products	Steel & Other Metals	Aerospace & Defence	Diversified Industrials	Electronic & Electrical Equipment	Engineering & Machinery	Automobiles and Parts	Household Goods & Textiles	Beverages	Food Producers & Processors	Health	Packaging [1]	Personal Care & Household Products	Pharma-ceuticals	Tobacco
DSM	G7	Canada	17.44	11.92	1.89	0.14	2.79	6.33	0.14	7.02	0.46	0.46	0.10	-	8.40	0.50	0.24	0.59	-	0.68	2.40
		United States	0.41	8.42	3.88	0.54	1.34	0.62	1.80	3.45	4.15	1.45	3.78	1.01	3.09	2.88	2.20	0.22	2.49	6.19	2.15
		France	-	9.78	5.14	5.60	-	0.52	1.17	8.89	2.66	0.10	4.76	1.81	4.66	6.10	0.30	1.89	4.27	2.90	-
		Germany	-	-	12.06	3.76	-	-	-	9.69	9.05	5.30	14.99	0.11	-	-	0.64	-	1.43	1.92	-
		United Kingdom	0.07	7.79	2.22	3.78	0.76	1.83	0.43	9.50	1.85	1.79	0.61	0.45	6.09	4.12	0.25	0.23	0.42	7.46	0.25
		Italy	-	0.78	0.58	1.62	0.48	-	0.17	5.52	-	-	10.68	0.29	-	2.44	1.02	-	-	-	-
		Japan	-	1.65	3.31	4.44	0.84	3.52	-	0.79	3.43	3.75	6.92	6.16	1.01	1.97	0.13	0.29	0.53	3.00	0.14
		Sub-group Summary	***2.56***	***5.76***	***4.15***	***2.84***	***0.89***	***1.83***	***0.53***	***6.41***	***3.08***	***1.84***	***5.98***	***1.41***	***3.32***	***2.57***	***0.68***	***0.46***	***1.31***	***3.16***	***0.70***
	Asia/ Australasia	Australia	30.57	3.60	1.52	6.01	-	1.60	-	11.36	0.08	0.62	0.21	0.65	2.69	2.55	0.16	2.90	-	0.33	0.38
		New Zealand	-	3.53	2.12	4.01	39.22	-	-	-	-	-	-	1.49	6.46	1.54	7.09	-	-	-	-
		Hong Kong/China	-	0.28	0.50	0.31	-	-	-	23.80	0.48	0.15	0.33	0.60	-	0.34	-	-	-	-	0.70
		Singapore	-	-	-	0.60	-	1.37	0.16	4.69	1.12	15.56	3.75	-	4.57	0.48	0.50	-	-	-	1.14
		Sub-group Summary	***7.64***	***1.85***	***1.03***	***2.73***	***9.81***	***0.74***	***0.04***	***9.96***	***0.42***	***4.08***	***1.07***	***0.68***	***3.43***	***1.23***	***1.94***	***0.73***	***0.00***	***0.08***	***0.56***
ESM	*Advanced*	Brazil	11.61	14.66	1.41	0.82	6.28	6.03	4.36	3.89	-	-	-	-	2.89	-	-	-	-	-	0.54
		Mexico	3.06	-	-	14.06	2.29	2.96	-	15.13	-	-	-	-	4.05	2.23	-	-	-	-	3.22
		Israel	-	1.76	8.62	8.21	-	-	2.40	9.37	4.51	4.23	0.24	0.29	-	3.40	-	-	-	6.99	-
		Korea	-	5.47	2.07	6.18	-	8.12	-	0.37	15.26	7.42	2.97	0.90	0.96	0.46	-	-	0.40	0.30	1.72
		Taiwan/China	-	-	7.01	4.34	1.14	6.26	-	-	2.07	1.87	0.81	9.20	-	1.57	0.10	-	-	-	-
		South Africa	59.07	2.58	-	1.76	1.13	0.64	-	9.17	0.60	-	-	0.71	0.63	6.24	0.20	1.40	-	-	-
		Sub-group Summary	***12.29***	***4.08***	***3.19***	***5.90***	***1.81***	***4.00***	***1.13***	***6.32***	***3.74***	***2.25***	***0.67***	***1.85***	***1.42***	***2.32***	***0.05***	***0.23***	***0.07***	***1.21***	***0.91***
	Asia	India	-	0.86	18.26	4.37	-	10.02	0.40	9.93	1.36	10.33	2.53	-	-	6.57	-	-	11.64	1.59	-
		Pakistan	-	18.46	43.04	-	-	-	-	3.97	-	-	-	4.87	-	-	-	-	-	1.23	-
		China	5.32	28.26	12.71	15.39	0.90	2.56	-	-	4.20	15.95	15.19	8.92	1.13	1.60	-	3.97	-	0.28	-
		Indonesia	0.75	1.20	-	8.94	1.80	-	-	-	-	0.59	4.64	1.14	-	1.17	-	-	-	1.32	26.98
		Malaysia	-	-	-	9.10	-	-	-	-	0.55	-	7.51	-	-	16.77	-	-	-	-	1.54
		Philippines	-	8.21	-	0.96	-	-	-	23.77	-	-	-	-	11.30	2.52	-	-	-	-	-
		Thailand	3.06	10.81	0.48	16.89	-	-	-	-	-	-	-	-	-	1.55	-	-	-	-	-
		Sub-group Summary	***1.30***	***9.69***	***10.64***	***7.95***	***0.39***	***1.80***	***0.06***	***5.38***	***0.87***	***3.84***	***4.27***	***2.13***	***1.78***	***4.31***	***0.00***	***0.57***	***1.66***	***0.63***	***4.07***
	Europe	Czech Republic	2.17	-	1.96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.05
		Hungary	-	27.00	19.60	-	-	-	-	-	-	2.51	-	3.25	-	3.41	-	-	-	31.15	-
		Poland	-	5.34	-	14.47	1.18	2.29	-	-	37.12	-	1.36	-	-	-	-	-	-	-	-
		Turkey	-	1.41	-	7.62	-	20.63	-	14.33	1.94	-	8.92	20.42	4.88	-	-	-	-	-	-
		Russia	-	34.77	-	-	-	3.93	-	-	-	-	-	-	-	-	-	-	-	-	-
		Sub-group Summary	***0.43***	***13.70***	***4.31***	***4.42***	***0.24***	***5.37***	-	***2.87***	***7.81***	***0.50***	***2.06***	***4.74***	***0.98***	***0.68***	-	-	-	***6.23***	***0.81***
	Lat. America	Argentina	-	47.48	0.43	0.86	-	2.16	-	-	-	-	2.82	-	-	3.40	-	-	-	-	-
		Chile	-	9.12	1.66	1.92	7.99	-	-	1.21	-	-	-	-	6.06	-	-	1.48	-	1.77	1.64
		Colombia	-	-	-	32.16	-	-	-	15.98	-	-	-	-	18.03	8.81	-	-	-	-	-
		Peru	7.04	-	-	3.17	-	7.51	-	-	-	-	-	-	17.59	-	-	-	-	-	-
		Sub-group Summary	***1.76***	***14.15***	***0.52***	***9.53***	***2.00***	***2.42***	-	***4.30***	-	-	***0.70***	-	***10.42***	***3.05***	-	***0.37***	-	***0.44***	***0.41***
All Sample Countries			***1.12***	***5.90***	***2.74***	***1.52***	***0.68***	***1.07***	***0.98***	***3.46***	***3.35***	***1.55***	***3.54***	***1.55***	***2.42***	***1.97***	***1.79***	***0.20***	***1.78***	***6.63***	***1.03***

(Appendix B.5 - *Continued*)

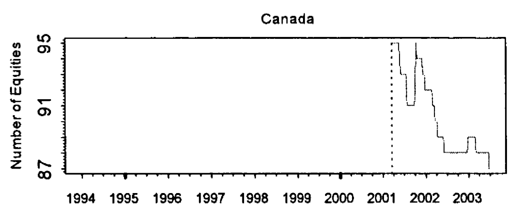
Group	Sub-group	Country	FTSE Economic Group																			
			Cyclical Services						Non-Cyclical Services		Utilities				Financials						Information Technology	
			Distributors [1]	General Retailers	Leisure, Entertain-ment & Hotels	Media & Photography	Support Services	Transport	Food & Drug Retailers	Telecommun i-cation Services	Electricity	Gas Distribution [2]	Water [2]	Utilities, Others [3]	Banks	Insurance	Life Assurance	Investment Companies	Real Estate	Speciality & Other Finance	Information Technology Hardware	Software & Computer Services
DSM	*G7*	Canada	-	1.31	0.31	5.63	1.27	1.73	1.58	2.11	1.93	1.69	-	4.20	5.04	1.62	0.13	-	0.52	1.94	12.64	0.23
		United States	0.47	5.40	1.48	3.55	0.83	2.16	0.88	9.13	5.91	0.77	-	0.19	5.84	2.42	1.00	0.10	0.03	2.85	5.37	1.75
		France	0.71	1.93	1.43	3.77	0.30	0.82	5.60	1.66	-	-	0.69	4.38	7.60	4.11	-	-	2.09	5.31	6.49	0.57
		Germany	0.46	2.46	0.73	-	1.14	0.96	-	2.80	1.41	-	-	11.09	18.50	17.89	-	-	-	-	3.21	0.98
		United Kingdom	0.66	6.24	1.20	4.11	0.38	2.45	2.99	7.39	2.27	2.39	1.31	2.84	10.93	2.64	1.52	0.71	1.83	1.32	0.04	0.53
		Italy	-	0.86	-	0.26	-	0.30	-	24.58	1.44	1.69	-	2.48	9.02	26.35	5.20	1.83	-	5.45	2.93	-
		Japan	2.70	1.00	0.28	1.69	0.38	4.37	2.91	1.14	5.63	1.02	-	0.97	21.37	2.00	-	-	1.08	8.35	5.53	0.06
		Sub-group Summary	***0.72***	***2.74***	***0.78***	***2.72***	***0.61***	***1.83***	***2.00***	***6.97***	***2.66***	***1.08***	***0.29***	***3.74***	***11.19***	***8.15***	***1.12***	***0.38***	***0.79***	***3.60***	***5.17***	***0.59***
	Asia/ Australasia	Australia	0.47	3.48	0.14	3.39	0.07	3.28	1.59	2.18	-	0.58	-	1.00	17.11	0.68	1.21	0.68	4.74	1.03	-	-
		New Zealand	-	2.22	1.83	5.90	-	3.51	0.86	33.73	5.63	1.61	-	2.00	3.91	-	-	11.57	0.09	5.13	-	-
		Hong Kong/China	0.39	4.45	2.35	1.16	-	3.74	1.17	2.10	9.01	2.04	-	3.79	9.87	0.85	-	-	38.60	1.07	1.14	-
		Singapore	0.93	0.59	3.66	4.71	-	8.18	-	7.80	-	-	-	-	20.64	-	2.18	1.42	17.61	-	1.05	-
		Sub-group Summary	***0.44***	***2.68***	***1.99***	***3.79***	***0.02***	***4.68***	***0.91***	***11.45***	***3.66***	***1.06***	-	***1.70***	***12.88***	***0.38***	***0.85***	***3.42***	***15.26***	***1.81***	***0.55***	-
ESM	*Advanced*	Brazil	-	2.13	-	0.78	-	-	1.67	26.63	13.81	-	1.45	-	9.83	-	-	-	-	-	-	-
		Mexico	-	13.77	-	8.68	-	-	-	31.43	-	-	-	-	2.52	-	-	-	-	2.62	-	-
		Israel	0.24	0.74	-	1.69	-	-	2.41	5.14	-	-	-	-	15.43	6.28	-	5.85	1.51	-	5.34	7.81
		Korea	-	2.22	-	-	0.42	1.59	-	3.11	22.27	-	-	0.74	21.04	1.66	-	-	-	4.50	1.83	-
		Taiwan/China	-	0.34	-	0.43	-	5.00	-	0.22	-	-	-	-	25.50	2.21	12.39	-	1.56	14.12	4.95	-
		South Africa	0.26	1.84	77.37	0.07	0.08	1.25	0.18	0.79	-	-	-	-	6.36	-	7.95	0.28	-	2.70	-	1.71
		Sub-group Summary	***0.08***	***3.51***	***12.90***	***1.94***	***0.08***	***1.31***	***0.71***	***11.22***	***6.01***	-	***0.24***	***0.12***	***13.45***	***1.69***	***3.39***	***1.02***	***0.51***	***3.99***	***2.02***	***1.59***
	Asia	India	-	-	-	5.69	-	1.88	-	13.34	2.13	-	-	1.70	11.29	-	-	-	-	5.19	1.18	4.38
		Pakistan	-	-	-	-	-	1.35	-	48.62	10.30	15.13	-	9.19	23.37	-	-	5.15	-	-	-	-
		China	11.20	-	-	-	-	8.63	-	8.45	8.76	-	-	-	-	-	-	-	17.42	-	5.68	1.30
		Indonesia	0.61	2.22	2.25	4.98	-	2.14	-	25.62	-	-	-	-	11.83	-	0.73	-	4.84	1.77	-	-
		Malaysia	9.09	-	27.58	-	-	2.38	-	6.27	7.89	1.89	-	4.76	17.95	-	-	-	-	3.00	0.76	-
		Philippines	1.94	-	-	6.70	-	0.80	-	10.85	12.81	-	-	-	15.12	-	-	-	19.93	-	-	-
		Thailand	0.45	1.28	0.54	1.44	-	0.53	-	12.38	4.57	-	-	-	39.18	-	-	-	7.06	13.14	7.37	-
		Sub-group Summary	***3.33***	***0.50***	***4.34***	***2.69***	-	***2.53***	-	***17.93***	***6.64***	***2.43***	-	***2.24***	***16.96***	-	***0.10***	***0.74***	***7.04***	***3.30***	***2.14***	***0.81***
	Europe	Czech Republic	-	-	-	2.53	-	-	-	23.05	25.85	-	-	-	42.55	-	-	-	-	-	-	-
		Hungary	-	-	3.20	-	-	-	-	20.60	2.52	-	-	-	9.89	-	-	-	-	-	-	-
		Poland	-	-	3.64	13.72	-	-	-	24.58	-	-	-	-	12.98	0.52	-	-	-	35.43	-	1.92
		Turkey	-	3.47	-	0.37	-	-	0.42	-	11.25	-	-	1.47	6.54	0.68	-	2.92	-	1.37	3.55	-
		Russia	-	-	-	-	-	-	-	-	61.31	-	-	-	-	-	-	-	-	-	-	-
		Sub-group Summary	-	***0.69***	***1.37***	***3.33***	-	-	***0.08***	***13.64***	***20.19***	-	-	***0.29***	***14.39***	***0.24***	-	***0.58***	-	***7.36***	***0.71***	***0.38***
	Lat. America	Argentina	-	-	-	-	-	-	-	33.09	1.44	4.28	-	3.05	9.11	-	-	-	1.08	-	-	-
		Chile	-	2.22	-	-	-	2.09	-	25.92	48.82	2.26	-	2.10	4.32	-	-	4.81	-	1.80	-	-
		Colombia	-	6.46	-	-	-	-	4.49	-	-	-	-	-	22.88	-	-	13.64	-	-	-	-
		Peru	-	-	-	-	-	-	-	40.91	6.09	-	-	-	23.78	-	-	-	-	-	-	-
		Sub-group Summary	-	***2.17***	-	-	-	***0.52***	***1.12***	***24.98***	***14.09***	***1.64***	-	***1.29***	***15.02***	-	-	***4.61***	***0.27***	***0.45***	-	-
All Sample Countries			***0.65***	***3.64***	***1.92***	***2.84***	***0.64***	***1.94***	***1.58***	***6.72***	***3.10***	***0.75***	***0.11***	***0.06***	***11.43***	***3.56***	***1.00***	***0.20***	***1.17***	***4.02***	***8.02***	***3.38***

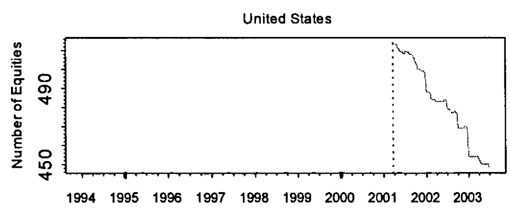
Note: [1] Discontinues on December 31, 2001; [2] Discontinues on December 31, 2002; and, [3] Available since January 1, 2003.

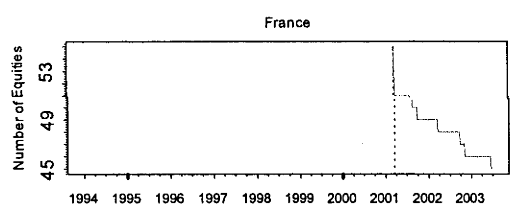
Appendix B.6

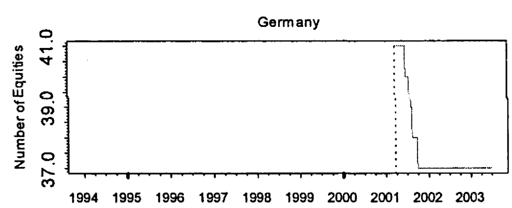
Time Series Plots of Weekly (Wednesday-to-Wednesday) Average Number of Equities for All 33 Sample National Stock Markets (January 1994 – June 2003)

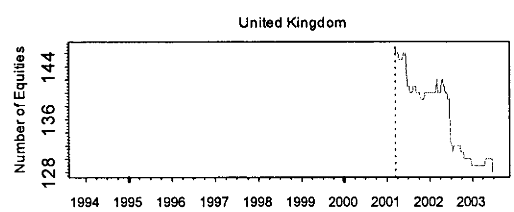
This group of figures provides the time series plots of weekly (Wednesday-to-Wednesday) average number of equities (NE) for all 33 sample national stock markets during the full sample period from January 12, 1994 through June 25, 2003. The weekly average number of equities is computed as a simple average of daily number of equities within one week. The reference line (dotted line) within each plot marks the first week, i.e. the week begins on July 3, 2001, when NE data are available for all Developed Stock Markets (DSM) group and some Emerging Stock Markets (ESM) group of countries. If there are missing daily observations within a week, then that week is labeled as missing observation. The order of the sample national stock markets in this plot follows our grouping strategy, i.e., G7 countries are plotted first then followed by DSMs located in Asian/Australasian region and so on.

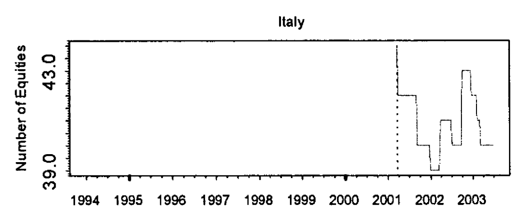


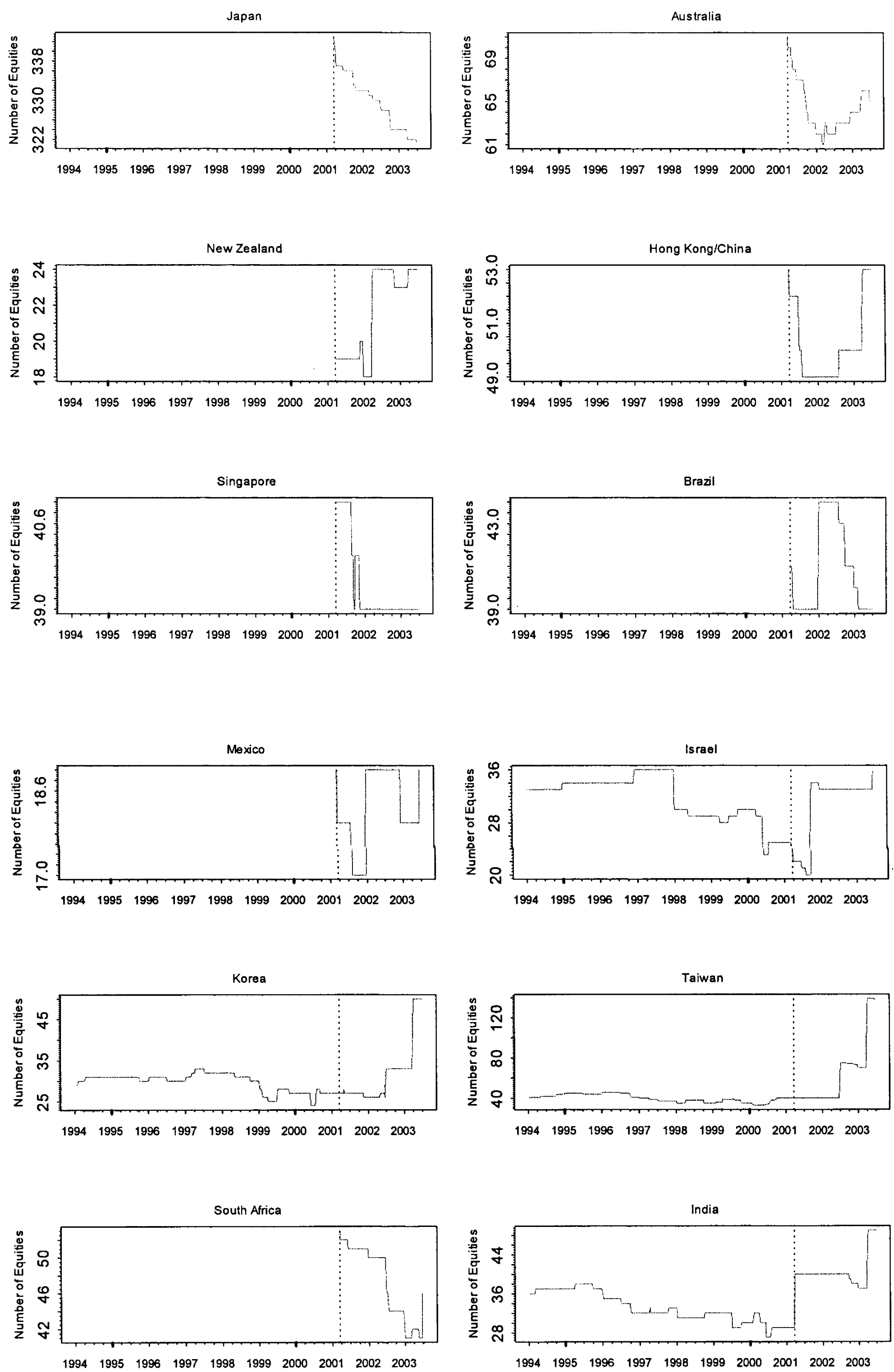


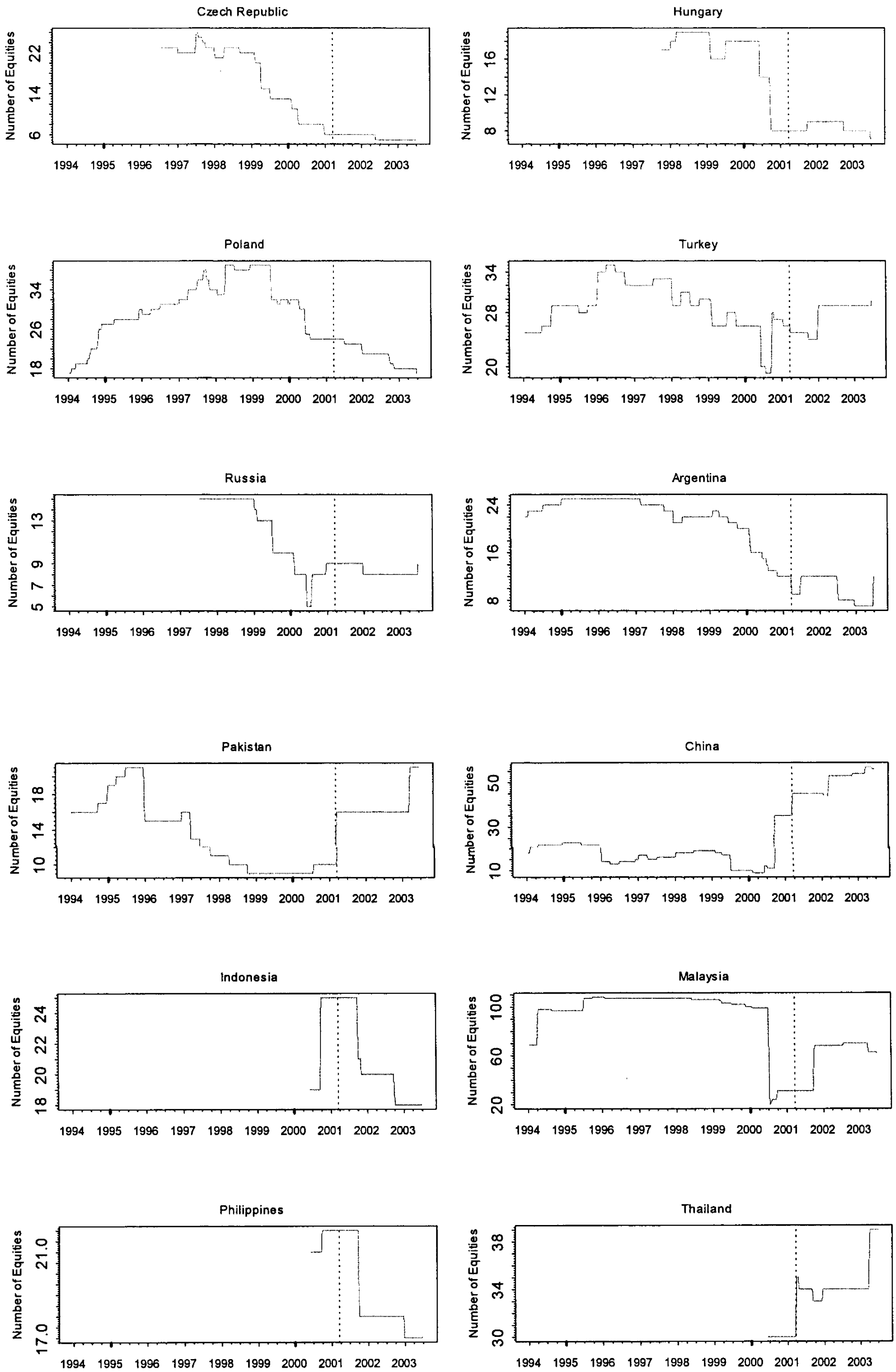




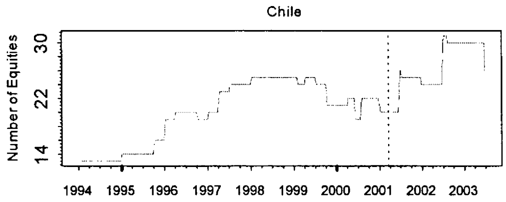


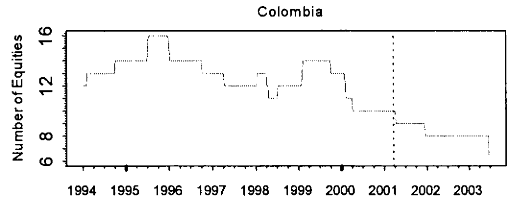


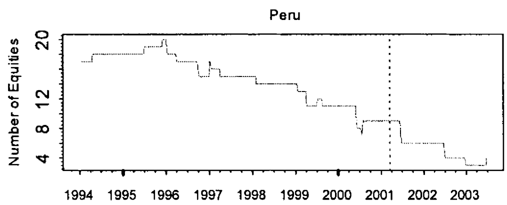

Japan
Number of Equities
322 330 338
Australia
Number of Equities
61 65 69
New Zealand
Number of Equities
18 20 22 24
Hong Kong/China
Number of Equities
49.0 51.0 53.0
Singapore
Number of Equities
39.0 40.6
Brazil
Number of Equities
39.0 43.0
Mexico
Number of Equities
17.0 18.6
Israel
Number of Equities
20 28 36
Korea
Number of Equities
25 35 45
Taiwan
Number of Equities
40 80 120
South Africa
Number of Equities
42 46 50
India
Number of Equities
28 36 44
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003



Czech Republic
Number of Equities
6 14 22
Hungary
8 12 16
Poland
18 26 34
Turkey
20 28 34
Russia
5 7 9 13
Argentina
8 16 24
Pakistan
10 14 18
China
10 30 50
Indonesia
18 20 22 24
Malaysia
20 60 100
Philippines
17.0 21.0
Thailand
30 34 38
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003


Chile
Number of Equities
14
22
30
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003


Colombia
Number of Equities
6
8
12
16
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003


Peru
Number of Equities
4
8
12
20
1994 1995 1996 1997 1998 1999 2000 2001 2002 2003

Appendix B.7

Summary Statistics for U.S. Dollar-Denominated, Value-Weighted Returns on Aggregate FTSE Industry Sector Indices (January 1994 - June 2003)

This table presents the summary statistics for U.S. dollar-denominated, cap-weighted returns on aggregate FTSE All-World Industry Sectors indices during the full sample period from January 12, 1994 to June 25, 2003. Our sample comprises 39 FTSE Industry Sectors for both developed and developing countries. Raw continuously compounded weekly returns are calculated as log changes of Wednesday-to-Wednesday closing total return indices (including both capital gain and dividend yield as provided by Datastream International) from January 5, 1994 (the first Wednesday available in the sample period) to June 25, 2003 (494 observations in total). Then aggregate FTSE Industry Sector returns are value-weighted within a given industry across sample countries. The market capitalizations are collected at the beginning-of-week.

In Panel A, primary statistics for 39 FTSE Industry Sectors, are reported. Annualized mean and standard deviations of raw returns are reported maximum (minimum) return is the one-week return in percentage within full sample period and maximum (minimum) week is the entry number for the week in which maximum (minimum) return is obtained since the start of the sample period. LQ(k) [LQ^2(k)] is the Box-Ljung Portmanteau test for autocorrelations up to *k*-th lag for raw (squared) returns. Cross-sectional Herfindahl Concentration Indices (HCIs) are obtained by using the beginning-of-week market capitalizations for FTSE Economic Groups/FTSE Industry Sectors as classified by FTSE Global Classification System 2002/2003 within the subject country. The reported HCI for individual national stock market in this table are simple time-series arithmetic average. The HCI would be 100 if a local market were concentrated in one economic group/industry group; its minimum value would be 1/10 (1/36), if every economic group (industry sector) were the same in size as measured by their respective aggregate market capitalization within the subject country.

In Panel B, optimal lags selected by Akaike Information Criterion (AIC) and Schwartz Bayesian Information Criterion (BIC) are reported at the maximum lags of 6, 12, and 52 respectively. Correspondent *t*-statistics and *p*-values for the optimal lags are also reported.

In Panel C, distributional tests are reported for both normal distribution and an alternative fat-tailed *t*-distribution with degree of freedom of 1, 2, 3, 4, 5, 10, 15, 20, and 25. For *t*-distribution, the smaller is the degree of freedom, the fatter is the tail. Empirically, *t*-distribution with 25 degree of freedom is approximately normally distributed.

Significance at the 1% level is denoted by ***, at the 5% level by **, and at the 10% level by *.

Panel A: Primary Statistics

Economic Group	Industry Sector	Mean [1]	Standard Deviation [1]	Maximum	Maximum Week	Minimum	Minimum Week	1	2	3	4	5	6	LQ(6)	LQ(12)	LQ2(6)	Herfindahl Concentration on Index
FTSE Global Classification System		U.S. Dollar-denominated Index Return (%)															
				(in one week)				Autocorrelation									
Resources	Mining	1.12	21.98	9.10	379	-15.41	199	0.101	0.027	-0.002	0.012	-0.066	0.005	7.77	9.65	13.11**	25.25
	Oil & Gas	8.78	17.78	9.89	270	-9.59	446	-0.110	-0.039	0.006	-0.021	0.019	-0.049	8.33	15.20	124.87***	37.15
Basic Industries	Chemicals	4.16	16.84	10.04	480	-8.44	419	-0.001	0.001	-0.025	0.002	0.041	0.000	1.15	4.02	30.13***	29.40
	Construction & Building Materials	-5.42	16.45	7.81	250	-7.93	401	0.068	0.059	0.049	-0.056	0.035	0.050	8.70	10.57	48.35***	21.83
	Forestry & Paper Products	0.06	21.28	12.46	275	-11.34	199	-0.007	-0.017	0.037	0.011	0.099	-0.041	6.68	14.52	29.84***	40.60
	Steel & Other Metals	-4.88	21.04	9.77	458	-11.88	401	0.045	0.072	0.014	-0.016	0.033	0.022	4.60	10.43	59.80***	28.04
General Industries	Aerospace & Defence	6.22	20.67	12.69	480	-14.96	402	0.035	0.040	0.028	0.015	0.054	0.015	3.47	7.37	9.620	75.78
	Diversified Industrials	1.45	19.47	12.55	447	-12.24	402	-0.065	-0.015	0.017	-0.049	-0.003	0.073	6.30	16.97	61.28***	32.44
	Electronic & Electrical Equipment	8.61	20.24	9.30	426	-10.17	401	0.010	-0.018	0.067	-0.021	0.026	-0.003	3.05	10.17	61.71***	37.11
	Engineering & Machinery	0.39	17.57	9.03	458	-10.68	457	-0.017	0.017	0.043	-0.071	0.102	-0.032	9.45	18.73*	82.32***	32.15
Cyclical Consumer	Automobiles and Parts	1.74	18.52	10.92	250	-12.40	402	-0.022	0.032	0.037	-0.074	0.068	-0.014	6.59	10.72	64.09***	30.33
	Household Goods & Textiles	-1.52	19.66	10.57	311	-9.78	401	-0.007	0.030	0.069	-0.085	0.037	-0.026	7.46	11.11	37.85***	44.38
Non-Cyclical Consumer Goods	Beverages	6.86	16.45	7.23	248	-12.48	243	-0.042	0.100	0.004	-0.022	-0.045	-0.010	7.14	12.12	29.64***	45.94
	Food Producers & Processors	5.25	11.96	6.70	447	-6.48	446	-0.010	0.070	-0.083	0.086	-0.056	0.082	14.51**	17.97	34.81***	33.73
	Health	14.42	18.22	11.09	447	-7.50	199	-0.130	-0.014	-0.088	0.086	-0.113	0.032	23.07***	30.58***	21.44***	90.38
	Packaging [a]	-3.34	17.60	11.58	250	-10.27	375	0.106	0.029	0.014	-0.012	0.000	-0.072	8.74	23.89**	45.47***	32.46
	Personal Care & Household Products	11.22	17.25	7.92	314	-21.12	322	-0.051	0.066	-0.031	0.027	-0.105	0.076	12.74**	21.08**	16.92***	57.98
	Pharmaceuticals	13.20	18.45	13.83	447	-7.34	243	-0.102	0.038	-0.005	-0.018	-0.051	-0.013	7.43	12.84	18.79***	47.64
	Tobacco	10.27	23.47	11.63	345	-13.94	442	0.071	-0.040	0.088	-0.033	-0.090	0.088	15.60**	21.51**	6.650	52.16
Cyclical Services	Distributors [a]	-3.40	17.51	9.90	250	-10.67	401	-0.029	0.065	-0.025	0.015	-0.053	-0.027	4.71	17.61	65.23***	44.41
	General Retailers	5.82	20.50	10.70	458	-9.49	401	-0.023	-0.067	-0.060	0.121	-0.017	-0.003	11.78*	25.43**	48.00***	49.93
	Leisure, Entertainment & Hotels	-0.62	21.02	11.60	250	-14.50	402	-0.032	-0.020	0.109	-0.053	0.133	0.064	18.92***	39.89***	95.62***	45.24
	Media & Photography	4.37	20.16	11.62	458	-9.50	446	-0.060	0.035	0.102	-0.109	0.091	0.039	18.42***	25.09**	119.30***	33.81
	Support Services	-3.15	17.71	8.37	458	-12.16	287	-0.033	0.048	0.013	-0.072	0.050	-0.013	5.69	9.78	20.43***	38.62
	Transport	-0.78	13.51	6.85	250	-7.63	402	-0.012	-0.013	-0.005	-0.009	-0.010	0.018	0.43	9.68	26.94***	30.36
Non-Cyclical Services	Food & Drug Retailers	3.65	15.50	9.26	480	-9.02	319	-0.025	0.068	-0.011	0.019	-0.075	0.062	7.60	21.06**	41.10***	29.00
	Telecommunication Services	1.69	20.78	9.03	480	-12.64	363	-0.022	0.041	0.028	0.019	-0.013	0.059	3.45	10.90	63.32***	34.42
Utilities	Electricity	1.26	13.15	6.50	447	-12.44	457	-0.049	0.103	-0.057	0.033	-0.076	-0.021	11.83*	18.29	52.95***	36.51
	Gas Distribution [b]	-1.71	17.64	13.04	404	-14.49	407	-0.005	0.038	-0.055	-0.038	0.054	0.064	6.51	21.39**	104.27***	30.80
	Water [b]	6.37	22.31	13.12	350	-14.74	317	-0.049	0.003	-0.113	-0.089	-0.076	0.025	14.76**	19.27*	5.66	89.61
	Utilities, Others [c]	0.71	5.40	6.21	480	-7.98	479	-0.179	0.469	0.078	0.113	0.030	-0.187	152.99***	263.76***	426.39***	17.70
Financials	Banks	4.26	19.94	13.32	458	-10.03	446	-0.051	0.059	-0.024	-0.048	-0.034	-0.009	5.10	24.61**	65.70***	27.40
	Insurance	4.85	19.60	15.01	458	-11.40	446	-0.110	0.050	0.005	-0.083	-0.025	0.011	11.10*	21.12**	69.21***	33.07
	Life Assurance	4.71	19.37	12.89	480	-10.10	454	-0.098	-0.009	0.011	-0.047	0.033	0.030	6.97	17.45	68.73***	31.46
	Investment Companies	4.24	17.41	7.83	458	-10.38	326	-0.035	0.052	0.012	-0.057	-0.001	0.079	6.78	23.48**	65.78***	44.08
	Real Estate	-4.90	20.45	11.60	250	-13.61	198	0.063	0.077	0.037	-0.094	0.019	-0.008	10.24	17.61	55.14***	25.66
	Speciality & Other Finance	4.32	23.42	13.84	458	-10.99	457	-0.097	0.006	0.029	-0.059	0.021	-0.008	7.14	18.59*	80.13***	50.07
Information Technology	Information Technology Hardware	3.95	32.63	13.45	379	-19.07	363	-0.029	0.005	0.124	-0.046	0.027	0.053	10.89*	29.51***	107.77***	57.00
	Software & Computer Services	12.63	30.38	14.75	379	-19.88	363	-0.013	0.015	0.037	-0.055	0.013	-0.018	2.60	15.88	37.83***	82.02

Panel B: Optimal Lags (AR Model) Selected by Schwartz Bayesian (BIC) and Akaike (AIC) Information Criteria

FTSE Global Classification System		Maximum Number Lags																	
		6						12						52					
		BIC			AIC			BIC			AIC			BIC			AIC		
Economic Group	Industry Sector	Optimal Lag	*T*-stat	*P*-value	Optimal Lag	*T*-stat	*P*-value	Optimal Lag	*T*-stat	*P*-value	Optimal Lag	*T*-stat	*P*-value	Optimal Lag	*T*-stat	*P*-value	Optimal Lag	*T*-stat	*P*-value
Resources	Mining	1	2.337**	0.020	1	2.337**	0.020	1	2.325**	0.021	1	2.325**	0.021	1	2.231**	0.026	1	2.231**	0.026
	Oil & Gas	1	-2.395**	0.017	1	-2.395**	0.017	1	-2.391**	0.017	1	-2.391**	0.017	1	-2.330**	0.020	1	-2.330**	0.020
Basic Industries	Chemicals	1	-0.022	0.982	1	-0.022	0.982	1	-0.046	0.963	1	-0.046	0.963	1	0.103	0.918	1	0.103	0.918
	Construction & Building Materials	1	1.500	0.134	1	1.500	0.134	1	1.503	0.133	1	1.503	0.133	1	1.504	0.133	1	1.504	0.133
	Forestry & Paper Products	1	-0.122	0.903	1	-0.122	0.903	1	-0.138	0.890	1	-0.138	0.890	1	-0.019	0.985	7	-2.397**	0.017
	Steel & Other Metals	1	1.026	0.305	2	1.513	0.131	1	1.130	0.259	2	1.466	0.143	1	1.122	0.263	1	1.122	0.263
General Industries	Aerospace & Defence	1	0.796	0.427	1	0.796	0.427	1	0.795	0.427	1	0.795	0.427	1	0.858	0.392	1	0.858	0.392
	Diversified Industrials	1	-1.392	0.165	1	-1.392	0.165	1	-1.395	0.164	1	-1.395	0.164	1	-1.250	0.212	1	-1.250	0.212
	Electronic & Electrical Equipment	1	0.248	0.804	1	0.248	0.804	1	0.237	0.813	1	0.237	0.813	1	0.353	0.724	1	0.353	0.724
	Engineering & Machinery	1	-0.345	0.730	1	-0.345	0.730	1	-0.331	0.740	7	-2.370**	0.018	1	-0.298	0.766	7	-2.381**	0.018
Cyclical Consumer	Automobiles and Parts	1	-0.411	0.682	1	-0.411	0.682	1	-0.435	0.664	1	-0.435	0.664	1	-0.279	0.781	1	-0.279	0.781
	Household Goods & Textiles	1	-0.140	0.889	4	-1.895*	0.059	1	-0.034	0.973	4	-2.059**	0.040	1	0.038	0.970	4	-2.042**	0.042
Non-Cyclical Consumer Goods	Beverages	1	-0.831	0.406	2	2.174**	0.030	1	-0.825	0.410	2	2.240**	0.026	1	-0.728	0.467	2	2.223**	0.027
	Food Producers & Processors	1	-0.112	0.910	4	1.847*	0.065	1	-0.140	0.889	4	1.793*	0.074	1	-0.133	0.894	4	1.835*	0.067
	Health	1	-2.835***	0.005	5	-2.249**	0.025	1	-2.876***	0.004	5	-2.328**	0.020	1	-2.791***	0.005	5	-2.044**	0.042
	Packaging [a]	1	2.448**	0.015	1	2.448**	0.015	1	2.392**	0.017	1	2.392**	0.017	1	2.627***	0.009	19	-2.762***	0.006
	Personal Care & Household Products	1	-1.092	0.275	2	1.414	0.158	1	-1.131	0.259	8	-2.650***	0.008	1	-0.860	0.390	8	-2.659***	0.008
	Pharmaceuticals	1	-2.238**	0.026	1	-2.238**	0.026	1	-2.310**	0.021	1	-2.310**	0.021	1	-2.238**	0.026	1	-2.238**	0.026
	Tobacco	1	1.563	0.119	6	2.000**	0.046	1	1.444	0.149	6	1.997**	0.046	1	1.668*	0.096	6	2.149**	0.032
Cyclical Services	Distributors [a]	1	-0.481	0.631	1	-0.481	0.631	1	-0.442	0.659	1	-0.442	0.659	1	-0.342	0.733	1	-0.342	0.733
	General Retailers	1	-0.480	0.632	4	2.514**	0.012	1	-0.447	0.655	7	-2.657***	0.008	1	-0.293	0.770	7	-2.570**	0.011
	Leisure, Entertainment & Hotels	1	-0.637	0.524	5	3.023***	0.003	1	-0.672	0.502	9	1.423	0.156	1	-0.615	0.539	8	-1.665*	0.097
	Media & Photography	1	-1.294	0.196	5	1.626	0.105	1	-1.302	0.193	8	-2.241**	0.025	1	-1.204	0.229	8	-2.126**	0.034
	Support Services	1	-0.495	0.621	1	-0.495	0.621	1	-0.540	0.590	1	-0.540	0.590	1	-0.593	0.554	1	-0.593	0.554
	Transport	1	-0.152	0.880	1	-0.152	0.880	1	-0.072	0.942	1	-0.072	0.942	1	0.087	0.931	1	0.087	0.931
Non-Cyclical Services	Food & Drug Retailers	1	-0.341	0.733	1	-0.341	0.733	1	-0.300	0.765	1	-0.300	0.765	1	-0.280	0.780	1	-0.280	0.780
	Telecommunication Services	1	-0.480	0.632	1	-0.480	0.632	1	-0.504	0.614	1	-0.504	0.614	1	-0.330	0.741	33	2.672***	0.008
Utilities	Electricity	1	-0.937	0.349	2	2.280**	0.023	1	-0.963	0.336	2	2.193**	0.029	1	-0.817	0.414	2	2.229**	0.026
	Gas Distribution [b]	1	0.102	0.919	1	0.102	0.919	1	0.099	0.921	11	2.488**	0.013	1	0.187	0.852	1	0.187	0.852
	Water [b]	1	-0.695	0.488	5	-1.952*	0.052	1	-0.696	0.487	5	-1.935*	0.054	1	-0.472	0.637	5	-1.469	0.143
	Utilities, Others [c]	6	-8.623***	0.000	6	-8.623***	0.000	10	2.760***	0.006	12	-3.243***	0.001	23	-26.700***	0.000	23	-26.700***	0.000
Financials	Banks	1	-1.071	0.285	1	-1.071	0.285	1	-1.054	0.292	12	-2.766***	0.006	1	-0.947	0.344	12	-2.708***	0.007
	Insurance	1	-2.398**	0.017	1	-2.398**	0.017	1	-2.387**	0.017	1	-2.387**	0.017	1	-2.224**	0.027	1	-2.224**	0.027
	Life Assurance	1	-2.061**	0.040	1	-2.061**	0.040	1	-2.089**	0.037	1	-2.089**	0.037	1	-1.996**	0.047	1	-1.996**	0.047
	Investment Companies	1	-0.639	0.523	1	-0.639	0.523	1	-0.669	0.504	11	2.868***	0.004	1	-0.506	0.613	11	2.880***	0.004
	Real Estate	1	1.743*	0.082	4	-2.370**	0.018	1	1.792*	0.074	4	-2.287**	0.023	1	2.065**	0.040	4	-2.143**	0.033
	Speciality & Other Finance	1	-2.316**	0.021	1	-2.316**	0.021	1	-2.198**	0.028	1	-2.198**	0.028	1	-2.102**	0.036	1	-2.102**	0.036
Information Technology	Information Technology Hardware	1	-0.629	0.530	3	2.734***	0.006	1	-0.641	0.522	7	-3.308***	0.001	1	-0.542	0.588	7	-3.248***	0.001
	Software & Computer Services	1	-0.260	0.795	1	-0.260	0.795	1	-0.221	0.825	1	-0.221	0.825	1	0.012	0.990	1	0.012	0.990

Panel C: Distributional Tests

FTSE Global Classification System				Normal Distribution				T-Distribution									
Economic Group	Industry Sector	Skewness	Excess Kurtosis	GMM_{HAC} $\chi2$ [3]	Jarque-Bera	Kolmogorov-Smirnov	Shapiro-Wilk (W)	GMM_{HAC} $\chi2$ [4]	Kolmogorov-Smirnov (D) [5]								
									1	2	3	4	5	10	15	20	25
Resources	Mining	-0.329	1.434	1.932	51.23***	0.037	0.986***	3.004	0.472	0.469	0.467	0.467	0.466	0.466	0.465	0.465	0.465
	Oil & Gas	-0.048	1.309	8.581**	35.46***	0.054***	0.987***	9.290**	0.475	0.472	0.471	0.471	0.470	0.470	0.469	0.469	0.469
Basic Industries	Chemicals	0.007	1.605	10.841***	53.05***	0.045**	0.984***	12.361***	0.474	0.471	0.470	0.470	0.469	0.469	0.468	0.468	0.468
	Construction & Building Materials	-0.049	1.046	13.796***	22.72***	0.049***	0.988***	7.011*	0.476	0.473	0.472	0.472	0.471	0.471	0.471	0.471	0.471
	Forestry & Paper Products	0.123	1.642	8.279**	56.77***	0.058***	0.983***	10.637**	0.470	0.467	0.466	0.465	0.465	0.464	0.464	0.463	0.463
	Steel & Other Metals	0.018	1.240	13.213***	31.69***	0.055***	0.984***	8.070**	0.471	0.468	0.467	0.466	0.466	0.465	0.465	0.465	0.465
General Industries	Aerospace & Defence	-0.713	3.255	7.208**	259.97***	0.069***	0.954***	12.714***	0.475	0.472	0.472	0.471	0.471	0.470	0.470	0.470	0.470
	Diversified Industrials	-0.189	2.692	8.889**	152.07***	0.058***	0.968***	14.253***	0.471	0.469	0.468	0.467	0.467	0.466	0.466	0.466	0.466
	Electronic & Electrical Equipment	-0.348	1.076	13.583***	33.78***	0.061***	0.983***	12.311***	0.474	0.471	0.470	0.470	0.469	0.468	0.468	0.468	0.468
	Engineering & Machinery	0.032	1.331	6.050**	36.53***	0.038*	0.987***	7.392*	0.477	0.475	0.474	0.473	0.473	0.472	0.472	0.472	0.472
Cyclical Consumer	Automobiles and Parts	-0.100	2.308	7.062**	110.45***	0.059***	0.975***	10.474**	0.472	0.469	0.468	0.468	0.467	0.467	0.467	0.466	0.466
	Household Goods & Textiles	0.176	1.550	15.456***	52.03***	0.062***	0.980***	12.508***	0.472	0.469	0.468	0.467	0.467	0.466	0.465	0.465	0.465
Non-Cyclical Consumer Goods	Beverages	-0.282	2.530	6.147**	138.30***	0.047***	0.973***	278.611***	0.477	0.474	0.473	0.473	0.473	0.472	0.472	0.472	0.471
	Food Producers & Processors	-0.124	1.784	14.983***	66.77***	0.059***	0.976***	13.622***	0.480	0.478	0.477	0.477	0.477	0.476	0.476	0.476	0.476
	Health	-0.137	0.778	9.031**	14.01***	0.041**	0.991***	6.867*	0.476	0.474	0.472	0.472	0.472	0.471	0.471	0.470	0.470
	Packaging [a]	-0.296	3.118	19.596***	207.39***	0.094***	0.947***	22.438***	0.473	0.471	0.470	0.469	0.469	0.468	0.468	0.468	0.468
	Personal Care & Household Products	-1.384	12.715	4.647*	3485.30***	0.059***	0.920***	9.417**	0.476	0.474	0.473	0.473	0.472	0.472	0.472	0.471	0.471
	Pharmaceuticals	0.171	1.738	5.345*	64.58***	0.047**	0.983***	5.588	0.477	0.474	0.473	0.473	0.472	0.471	0.471	0.471	0.471
	Tobacco	-0.464	1.691	9.349***	76.61***	0.057***	0.977***	478.788***	0.467	0.464	0.463	0.462	0.462	0.461	0.461	0.461	0.461
Cyclical Services	Distributors [a]	0.143	2.578	16.536***	138.48***	0.086***	0.958***	18.512***	0.473	0.470	0.469	0.468	0.468	0.467	0.467	0.467	0.467
	General Retailers	0.045	1.394	19.272***	40.16***	0.051***	0.982***	9.450**	0.471	0.467	0.466	0.466	0.465	0.464	0.464	0.464	0.464
	Leisure, Entertainment & Hotels	-0.010	3.058	16.680***	192.53***	0.066***	0.957***	19.412***	0.467	0.464	0.462	0.462	0.461	0.460	0.460	0.460	0.460
	Media & Photography	-0.164	1.952	29.461***	80.64***	0.075***	0.966***	13.828***	0.470	0.466	0.465	0.465	0.464	0.464	0.463	0.463	0.463
	Support Services	-0.615	2.787	8.476**	191.00***	0.072***	0.963***	12.561***	0.475	0.473	0.472	0.471	0.471	0.471	0.471	0.470	0.470
	Transport	0.005	0.879	4.689*	15.92***	0.037	0.994**	5.097	0.480	0.479	0.478	0.477	0.477	0.477	0.476	0.476	0.476
Non-Cyclical Services	Food & Drug Retailers	-0.086	2.304	13.106***	109.85***	0.053***	0.974***	17.585***	0.474	0.472	0.471	0.471	0.470	0.470	0.469	0.469	0.469
	Telecommunication Services	-0.537	1.577	5.735*	74.97***	0.065***	0.976***	8.732**	0.472	0.469	0.468	0.468	0.467	0.467	0.466	0.466	0.466
Utilities	Electricity	-0.741	5.104	2.077	581.30***	0.067***	0.952***	4.851	0.480	0.479	0.478	0.477	0.477	0.477	0.476	0.476	0.476
	Gas Distribution [b]	-0.599	5.051	5.475*	554.65***	0.083***	0.941***	11.679***	0.477	0.475	0.474	0.474	0.474	0.473	0.473	0.473	0.473
	Water [b]	-0.040	1.969	5.689*	79.96***	0.055***	0.980***	465.494***	0.469	0.466	0.465	0.464	0.464	0.463	0.463	0.463	0.463
	Utilities, Others [c]	-2.705	54.801	61.803***	62416.08**	0.479***	0.216***	40.823***	0.486	0.486	0.486	0.486	0.486	0.486	0.486	0.486	0.486
Financials	Banks	-0.066	2.058	12.881***	87.51***	0.050***	0.977***	16.598***	0.470	0.467	0.466	0.465	0.465	0.464	0.464	0.464	0.464
	Insurance	0.166	3.035	7.300**	191.92***	0.060***	0.967***	152.750***	0.472	0.470	0.469	0.468	0.468	0.467	0.467	0.467	0.467
	Life Assurance	-0.219	2.797	21.406***	164.93***	0.058***	0.962***	21.809***	0.474	0.472	0.471	0.471	0.471	0.470	0.470	0.470	0.470
	Investment Companies	-0.583	2.521	15.187***	158.82***	0.068***	0.964***	18.166***	0.475	0.472	0.471	0.471	0.470	0.470	0.469	0.469	0.469
	Real Estate	-0.412	2.102	6.669**	104.95***	0.056***	0.975***	9.430**	0.474	0.472	0.471	0.470	0.470	0.469	0.469	0.469	0.469
	Speciality & Other Finance	0.047	1.212	7.418**	30.41***	0.051***	0.989***	7.884**	0.468	0.464	0.463	0.462	0.462	0.461	0.461	0.461	0.461
Information Technology	Information Technology Hardware	-0.395	0.912	5.052*	29.96***	0.044**	0.988***	7.336*	0.463	0.459	0.458	0.457	0.456	0.455	0.455	0.455	0.454
	Software & Computer Services	-0.275	1.613	4.115	59.75***	0.033	0.984***	6.361*	0.462	0.458	0.457	0.456	0.456	0.455	0.454	0.454	0.454

Notes:

For statistical tests and measures:

[1] Means and standard deviations are annualized as follows: for Means, Average Weekly Return × 52; for Standard Deviations, Weekly Standard Deviation × $\sqrt{52}$.

[2] Number of Equities data series for some national stock markets within our sample are not available till March 7, 2001. They are G7 countries, Asian/Australasian DSMs, and Brazil, Mexico and South Africa in the ESM group.

[3] Heteroscedasticity-autocorrelation consistent (HAC) GMM test up to the lag of 4, as reported in Panel B using Schwartz Bayesian Information Criterion (BIC). Newey-West consistent standard deviations are used. WinRATS program is provided as an appendix to this chapter.

[4] The test series is demeaned and normalized by sample mean and standard deviation respectively, thus, moments of the centered *t*-distribution are used to to do this HAC-GMM tests. Maximum number of lags is the same as in normality tests.

[5] Almost all D-statistics reported in this column group are significant at 5% level, which strongly reject the null hypothesis that the national stock market index for the subject country is from a *t*-distribution with the given degree of freedom. A series of tests have been implemented with freedom from 1 to 25 and the results are the same as presented in this section. Empirically, a *t*-distribution with a degree of freedom of 25 is approximately normally distributed.

For FTSE Industry Sectors:

[a] Discontinues on December 31, 2001.

[b] Discontinues on December 31, 2002.

[c] Available since January 1, 2003.

Appendix B.8

Summary of Unconditional Correlations for U.S. Dollar-denominated, Value-Weighted 39 Industry Sector Index Returns (January 1994 – June 2003)

This table presents the summary of unconditional correlations for value-weighted, U.S. dollar-denominated index returns on 39 FTSE Industry Sectors during the full sample period, from January 12, 1994, to June 25, 2003, inclusive. Raw continuously compounded weekly returns are calculated as log changes of Wednesday-to-Wednesday closing total return indices (including both capital gain and dividend yield as provided by Datastream International) from January 12, 1994 (the first Wednesday available in the sample period) to June 25, 2003 (in total, 494 observations). Weekly (Wednesday-to-Wednesday) individual industry weights are calculated by using the beginning-of-the-week (i.e. from January 5, 1994 through June 18, 2003), U.S. dollar-denominated market capitalizations for each constituent industry sector in each sample country. Group arithmetic averages for ten aggregate FTSE Economic Groups are also reported.

FTSE Economic Group	FTSE Industry Sector	Mnemonics	Resource		Basic Industries				General Industries				Cyclical Consumer Goods		Non-Cyclical Consumer Goods							Cyclical Services						Non-Cyclical Services		Utilities				Financials						Information Technology	
Resource	Mining	iMN	*iMN*																																						
	Oil & Gas	iOG	0.42	*iOG*																																					
	FTSE Economic Group Avg.		***0.42***																																						
Basic Industries	Chemicals	iCH	0.54	0.50	*iCH*																																				
	Construction & Building Materials	iCB	0.49	0.42	0.74	*iCB*																																			
	Forestry & Paper Products	iFP	0.50	0.49	0.78	0.64	*iFP*																																		
	Steel & Other Metals	iSM	0.59	0.45	0.76	0.79	0.73	*iSM*																																	
	FTSE Economic Group Avg.		***0.50***		***0.74***																																				
General Industries	Aerospace & Defence	iAD	0.39	0.45	0.65	0.49	0.60	0.50	*iAD*																																
	Diversified Industrials	iDI	0.43	0.47	0.68	0.57	0.59	0.53	0.62	*iDI*																															
	Electronic & Electrical Equipment	iEE	0.37	0.40	0.67	0.64	0.55	0.58	0.52	0.64	*iEE*																														
	Engineering & Machinery	iEM	0.48	0.47	0.83	0.78	0.74	0.80	0.63	0.68	0.70	*iEM*																													
	FTSE Economic Group Avg.		***0.43***		***0.64***				***0.63***																																
Cyclical Consumer Goods	Automobiles and Parts	iAU	0.37	0.38	0.74	0.68	0.60	0.66	0.52	0.61	0.70	0.79	*iAU*																												
	Household Goods & Textiles	iHG	0.36	0.32	0.63	0.62	0.54	0.62	0.46	0.56	0.70	0.71	0.71	*iHG*																											
	FTSE Economic Group Avg.		***0.36***		***0.63***				***0.63***				***0.71***																												
Non-Cyclical Consumer Goods	Beverages	iBV	0.28	0.36	0.45	0.33	0.33	0.29	0.40	0.38	0.33	0.41	0.31	0.25	*iBV*																										
	Food Producers & Processors	iFO	0.29	0.39	0.55	0.40	0.42	0.37	0.48	0.46	0.33	0.51	0.40	0.32	0.68	*iFO*																									
	Health	iHL	0.19	0.34	0.41	0.28	0.35	0.24	0.45	0.51	0.40	0.36	0.33	0.28	0.50	0.51	*iHL*																								
	Packaging [1]	iPK	0.48	0.36	0.66	0.57	0.69	0.62	0.50	0.49	0.46	0.65	0.53	0.48	0.38	0.42	0.34	*iPK*																							
	Personal Care & Household Products	iPC	0.19	0.26	0.46	0.28	0.35	0.23	0.46	0.33	0.29	0.38	0.29	0.29	0.65	0.62	0.47	0.40	*iPC*																						
	Pharmaceuticals	iPH	0.15	0.35	0.45	0.31	0.34	0.24	0.43	0.50	0.42	0.43	0.38	0.31	0.51	0.57	0.73	0.28	0.50	*iPH*																					
	Tobacco	iTO	0.28	0.19	0.27	0.22	0.22	0.21	0.28	0.28	0.14	0.24	0.15	0.13	0.32	0.40	0.30	0.22	0.37	0.25	*iTO*																				
	FTSE Economic Group Avg.		***0.29***		***0.38***				***0.40***				***0.32***		***0.45***																										
Cyclical Services	Distributors [1]	iDS	0.31	0.28	0.54	0.66	0.48	0.61	0.34	0.37	0.49	0.64	0.56	0.57	0.29	0.32	0.27	0.59	0.22	0.28	0.13	*iDS*																			
	General Retailers	iGR	0.29	0.35	0.64	0.52	0.58	0.48	0.55	0.60	0.63	0.63	0.58	0.53	0.40	0.44	0.48	0.52	0.41	0.47	0.13	0.42	*iGR*																		
	Leisure, Entertainment & Hotels	iLE	0.33	0.38	0.59	0.51	0.54	0.51	0.53	0.72	0.69	0.64	0.64	0.54	0.30	0.32	0.47	0.46	0.26	0.48	0.19	0.40	0.62	*iLE*																	
	Media & Photography	iMP	0.39	0.39	0.60	0.56	0.54	0.51	0.50	0.73	0.78	0.63	0.62	0.61	0.27	0.29	0.44	0.42	0.27	0.44	0.19	0.40	0.62	0.79	*iMP*																
	Support Services	iSS	0.36	0.39	0.60	0.52	0.52	0.48	0.51	0.60	0.60	0.63	0.59	0.55	0.37	0.40	0.46	0.45	0.37	0.45	0.26	0.39	0.55	0.63	0.67	*iSS*															
	Transport	iTR	0.40	0.46	0.76	0.75	0.67	0.72	0.57	0.61	0.62	0.79	0.74	0.64	0.45	0.56	0.42	0.62	0.39	0.47	0.26	0.67	0.61	0.59	0.57	0.57	*iTR*														
	FTSE Economic Group Avg.		***0.36***		***0.58***				***0.60***				***0.60***		***0.37***							***0.57***																			
Non-Cyclical Services	Food & Drug Retailers	iFD	0.24	0.38	0.54	0.46	0.45	0.42	0.46	0.50	0.48	0.55	0.53	0.51	0.46	0.55	0.44	0.32	0.43	0.53	0.25	0.40	0.52	0.41	0.44	0.49	0.57	*iFD*													
	Telecommunication Services	iTS	0.29	0.33	0.48	0.48	0.43	0.40	0.34	0.61	0.67	0.48	0.47	0.48	0.26	0.27	0.36	0.29	0.21	0.38	0.14	0.30	0.49	0.62	0.76	0.57	0.44	0.36	*iTS*												
	FTSE Economic Group Avg.		***0.31***		***0.46***				***0.51***				***0.50***		***0.35***							***0.50***						***0.36***													
Utilities	Electricity	iEL	0.30	0.42	0.42	0.39	0.38	0.40	0.40	0.46	0.33	0.44	0.36	0.27	0.44	0.53	0.31	0.28	0.35	0.36	0.37	0.25	0.29	0.32	0.33	0.38	0.47	0.50	0.25	*iEL*											
	Gas Distribution [2]	iGD	0.33	0.57	0.39	0.38	0.33	0.36	0.33	0.47	0.38	0.40	0.37	0.29	0.26	0.33	0.30	0.33	0.17	0.32	0.23	0.29	0.33	0.39	0.44	0.37	0.44	0.40	0.36	0.56	*iGD*										
	Water [2]	iWT	0.09	0.15	0.13	0.12	0.10	0.08	0.13	0.12	0.08	0.13	0.10	0.09	0.21	0.27	0.13	0.05	0.18	0.16	0.20	0.06	0.07	0.06	0.11	0.16	0.19	0.28	0.08	0.32	0.31	*iWT*									
	Utilities, Others [3]	iUO	0.12	0.14	0.23	0.23	0.15	0.16	0.24	0.15	0.17	0.18	0.19	0.13	0.12	0.20	0.11	-	0.09	0.15	0.08	-	0.13	0.18	0.23	0.22	0.15	0.23	0.21	0.14	-	-	*iUO*								
	FTSE Economic Group Avg.		***0.27***		***0.27***				***0.28***				***0.23***		***0.24***							***0.25***						***0.29***		***0.33***											
Financials	Banks	iBK	0.39	0.49	0.73	0.68	0.62	0.64	0.59	0.73	0.71	0.76	0.69	0.63	0.47	0.56	0.51	0.54	0.42	0.57	0.27	0.52	0.66	0.69	0.69	0.65	0.75	0.55	0.59	0.46	0.44	0.16	0.20	*iBK*							
	Insurance	iIN	0.35	0.48	0.71	0.59	0.62	0.52	0.59	0.74	0.65	0.69	0.63	0.53	0.48	0.59	0.56	0.48	0.48	0.63	0.29	0.40	0.65	0.66	0.68	0.65	0.66	0.59	0.59	0.49	0.45	0.21	0.25	0.83	*iIN*						
	Life Assurance	iLA	0.36	0.44	0.66	0.52	0.56	0.47	0.61	0.70	0.61	0.63	0.59	0.49	0.44	0.59	0.52	0.46	0.46	0.58	0.30	0.33	0.61	0.64	0.66	0.67	0.61	0.55	0.57	0.44	0.41	0.23	0.28	0.78	0.84	*iLA*					
	Investment Companies	iIC	0.45	0.47	0.59	0.63	0.54	0.54	0.49	0.73	0.73	0.62	0.56	0.59	0.34	0.32	0.37	0.45	0.25	0.35	0.21	0.42	0.54	0.66	0.79	0.59	0.54	0.46	0.71	0.37	0.49	0.20	0.18	0.68	0.66	0.65	*iIC*				
	Real Estate	iRE	0.45	0.40	0.53	0.59	0.48	0.51	0.41	0.58	0.50	0.54	0.50	0.46	0.30	0.33	0.29	0.49	0.23	0.27	0.20	0.46	0.40	0.48	0.48	0.43	0.56	0.34	0.42	0.31	0.38	0.12	0.12	0.59	0.48	0.48	0.55	*iRE*			
	Speciality & Other Finance	iSF	0.31	0.41	0.68	0.63	0.58	0.59	0.55	0.70	0.73	0.74	0.67	0.66	0.37	0.45	0.52	0.53	0.37	0.56	0.20	0.53	0.67	0.71	0.71	0.64	0.71	0.51	0.62	0.41	0.45	0.10	0.18	0.89	0.78	0.72	0.65	0.50	*iSF*		
	FTSE Economic Group Avg.		***0.42***		***0.59***				***0.64***				***0.58***		***0.42***							***0.60***						***0.54***		***0.31***				***0.67***							
Information Technology	Information Technology Hardware	iIH	0.27	0.29	0.48	0.42	0.44	0.43	0.39	0.54	0.75	0.53	0.53	0.55	0.13	0.12	0.32	0.34	0.10	0.30	0.08	0.36	0.47	0.67	0.71	0.53	0.44	0.28	0.62	0.16	0.30	0.02	0.13	0.53	0.49	0.47	0.59	0.38	0.62	*iIH*	
	Software & Computer Services	iSC	0.23	0.29	0.45	0.39	0.41	0.38	0.40	0.57	0.67	0.49	0.47	0.46	0.17	0.17	0.41	0.33	0.17	0.37	0.10	0.33	0.52	0.64	0.68	0.52	0.43	0.30	0.61	0.16	0.31	0.05	0.11	0.52	0.49	0.48	0.55	0.34	0.60	0.81	*iSC*
	FTSE Economic Group Avg.		***0.27***		***0.43***				***0.54***				***0.50***		***0.22***							***0.53***						***0.45***		***0.15***				***0.50***						***0.81***	

Notes: [1] Discontinues on December 31, 2001; [2] Discontinues on December 31, 2002; and, [3] Available since January 1, 2003. :

Appendix B.9

Summary of Unconditional Correlations for U.S. dollar-denominated, Equally-weighted 39 Industry Sector Index Returns (January 1994 – June 2003)

This table presents the summary of unconditional correlations for equally-weighted, U.S. dollar-denominated index returns for 39 FTSE Industry Sectors during the full sample period, from January 12, 1994, to June 25, 2003, inclusive. Raw continuously compounded weekly returns are calculated as log changes of Wednesday-to-Wednesday closing total return indices (including both capital gain and dividend yield as provided by Datastream International) from January 12, 1994 (the first Wednesday available in the sample period) to June 25, 2003 (494 observations in total). Group arithmetic averages for ten aggregate FTSE Economic Groups are also reported.

FTSE Economic Group	FTSE Industry Sector	Mnemonics	*Resource*		*Basic Industries*				*General Industries*				*Cyclical Consumer Goods*		*Non-Cyclical Consumer Goods*							*Cyclical Services*						*Non-Cyclical Services*		*Utilities*				*Financials*						*Information Technology*	
Resource	Mining	iMN	***iMN***																																						
	Oil & Gas	iOG	0.59	***iOG***																																					
	FTSE Economic Group Avg.		***0.59***																																						
Basic Industries	Chemicals	iCH	0.58	0.70	***iCH***																																				
	Construction & Building Materials	iCB	0.63	0.71	0.74	***iCB***																																			
	Forestry & Paper Products	iFP	0.60	0.65	0.68	0.71	***iFP***																																		
	Steel & Other Metals	iSM	0.63	0.70	0.71	0.73	0.70	***iSM***																																	
	FTSE Economic Group Avg.		***0.65***		***0.71***																																				
General Industries	Aerospace & Defence	iAD	0.39	0.50	0.58	0.53	0.49	0.54	***iAD***																																
	Diversified Industrials	iDI	0.55	0.73	0.71	0.76	0.68	0.72	0.61	***iDI***																															
	Electronic & Electrical Equipment	iEE	0.46	0.63	0.70	0.68	0.59	0.65	0.63	0.70	***iEE***																														
	Engineering & Machinery	iEM	0.54	0.60	0.75	0.75	0.69	0.68	0.61	0.69	0.71	***iEM***																													
	FTSE Economic Group Avg.		***0.55***		***0.66***				***0.66***																														
Cyclical Consumer Goods	Automobiles and Parts	iAU	0.51	0.59	0.67	0.75	0.66	0.67	0.55	0.68	0.69	0.72	***iAU***																												
	Household Goods & Textiles	iHG	0.45	0.59	0.67	0.69	0.63	0.65	0.53	0.70	0.69	0.70	0.70	***iHG***																											
	FTSE Economic Group Avg.		***0.54***		***0.67***				***0.66***				***0.70***																										
Non-Cyclical Consumer Goods	Beverages	iBV	0.55	0.68	0.62	0.69	0.67	0.60	0.44	0.71	0.53	0.57	0.61	0.58	***iBV***																										
	Food Producers & Processors	iFO	0.53	0.60	0.63	0.73	0.67	0.57	0.41	0.66	0.51	0.65	0.63	0.64	0.66	***iFO***																									
	Health	iHL	0.30	0.38	0.42	0.36	0.40	0.35	0.42	0.46	0.39	0.40	0.36	0.39	0.41	0.39	***iHL***																								
	Packaging [1]	iPK	0.51	0.53	0.62	0.59	0.63	0.62	0.44	0.57	0.56	0.63	0.58	0.54	0.50	0.53	0.38	***iPK***																							
	Personal Care & Household Products	iPC	0.25	0.32	0.39	0.36	0.40	0.31	0.40	0.40	0.31	0.43	0.38	0.38	0.43	0.42	0.45	0.38	***iPC***																						
	Pharmaceuticals	iPH	0.39	0.50	0.56	0.58	0.54	0.46	0.45	0.59	0.51	0.62	0.58	0.54	0.54	0.61	0.42	0.39	0.49	***iPH***																					
	Tobacco	iTO	0.38	0.36	0.40	0.48	0.43	0.31	0.28	0.41	0.37	0.48	0.44	0.44	0.41	0.52	0.27	0.33	0.28	0.45	***iTO***																				
	FTSE Economic Group Avg.		***0.45***		***0.51***				***0.49***				***0.51***		***0.44***																								
Cyclical Services	Distributors [1]	iDS	0.51	0.52	0.61	0.70	0.60	0.57	0.46	0.62	0.58	0.73	0.65	0.60	0.53	0.62	0.35	0.58	0.29	0.52	0.47	***iDS***																			
	General Retailers	iGR	0.52	0.66	0.67	0.69	0.66	0.66	0.60	0.71	0.67	0.68	0.70	0.65	0.66	0.62	0.46	0.59	0.44	0.55	0.37	0.60	***iGR***																		
	Leisure, Entertainment & Hotels	iLE	0.51	0.59	0.67	0.73	0.64	0.61	0.55	0.70	0.66	0.75	0.73	0.71	0.61	0.71	0.39	0.54	0.39	0.62	0.52	0.72	0.68	***iLE***																	
	Media & Photography	iMP	0.47	0.57	0.64	0.66	0.62	0.59	0.55	0.72	0.75	0.65	0.68	0.65	0.56	0.58	0.40	0.47	0.27	0.53	0.39	0.57	0.66	0.73	***iMP***																
	Support Services	iSS	0.35	0.47	0.49	0.44	0.45	0.48	0.50	0.51	0.49	0.52	0.46	0.47	0.44	0.41	0.44	0.38	0.42	0.44	0.29	0.38	0.54	0.49	0.47	***iSS***															
	Transport	iTR	0.53	0.52	0.69	0.75	0.61	0.60	0.46	0.59	0.60	0.74	0.74	0.66	0.55	0.70	0.36	0.56	0.37	0.58	0.49	0.69	0.65	0.76	0.60	0.46	***iTR***														
	FTSE Economic Group Avg.		***0.52***		***0.62***				***0.62***				***0.64***		***0.49***							***0.60***																		
Non-Cyclical Services	Food & Drug Retailers	iFD	0.42	0.53	0.54	0.50	0.52	0.52	0.53	0.58	0.51	0.52	0.52	0.52	0.54	0.51	0.40	0.43	0.47	0.46	0.38	0.42	0.56	0.52	0.50	0.53	0.51	***iFD***													
	Telecommunication Services	iTS	0.53	0.65	0.66	0.69	0.60	0.61	0.51	0.74	0.72	0.61	0.61	0.59	0.62	0.60	0.41	0.43	0.26	0.51	0.39	0.56	0.65	0.66	0.79	0.46	0.57	0.47	***iTS***												
	FTSE Economic Group Avg.		***0.53***		***0.58***				***0.59***				***0.56***		***0.46***							***0.56***						***0.47***													
Utilities	Electricity	iEL	0.56	0.70	0.64	0.68	0.57	0.61	0.44	0.68	0.57	0.56	0.59	0.55	0.67	0.63	0.37	0.46	0.35	0.47	0.44	0.50	0.60	0.58	0.56	0.42	0.56	0.44	0.66	***iEL***											
	Gas Distribution [2]	iGD	0.42	0.50	0.53	0.48	0.43	0.42	0.40	0.52	0.42	0.45	0.46	0.39	0.47	0.46	0.36	0.37	0.31	0.41	0.40	0.42	0.49	0.50	0.44	0.42	0.46	0.39	0.51	0.56	***iGD***										
	Water [2]	iWT	0.19	0.18	0.17	0.12	0.14	0.09	0.18	0.18	0.11	0.14	0.11	0.10	0.21	0.13	0.22	0.12	0.21	0.22	0.15	0.03	0.16	0.15	0.17	0.24	0.11	0.26	0.17	0.20	0.29	***iWT***									
	Utilities, Others [3]	iUO	0.59	0.79	0.73	0.65	0.69	0.70	0.68	0.53	0.67	0.72	0.52	0.68	0.78	0.83	0.82	-	0.67	0.73	0.58	-	0.69	0.68	0.81	0.77	0.60	0.56	0.79	0.67	-	-	***iUO***								
	FTSE Economic Group Avg.		***0.49***		***0.48***				***0.45***				***0.43***		***0.44***							***0.45***						***0.47***		***0.43***											
Financials	Banks	iBK	0.60	0.75	0.76	0.83	0.71	0.73	0.59	0.83	0.71	0.74	0.75	0.71	0.74	0.74	0.44	0.56	0.40	0.63	0.48	0.68	0.76	0.77	0.71	0.51	0.73	0.56	0.76	0.75	0.57	0.15	0.84	***iBK***							
	Insurance	iIN	0.44	0.62	0.69	0.64	0.59	0.61	0.67	0.70	0.69	0.70	0.63	0.65	0.57	0.55	0.47	0.53	0.48	0.58	0.40	0.56	0.71	0.64	0.65	0.61	0.62	0.62	0.65	0.56	0.51	0.26	0.83	0.73	***iIN***						
	Life Assurance	iLA	0.39	0.51	0.60	0.54	0.57	0.53	0.60	0.59	0.59	0.58	0.57	0.55	0.51	0.53	0.49	0.50	0.48	0.51	0.32	0.49	0.60	0.58	0.53	0.57	0.57	0.52	0.55	0.50	0.51	0.25	0.66	0.65	0.78	***iLA***					
	Investment Companies	iIC	0.48	0.64	0.64	0.65	0.59	0.64	0.58	0.73	0.64	0.61	0.62	0.64	0.62	0.53	0.36	0.47	0.32	0.49	0.37	0.52	0.63	0.64	0.65	0.48	0.53	0.51	0.65	0.57	0.46	0.19	0.73	0.70	0.68	0.54	***iIC***				
	Real Estate	iRE	0.46	0.52	0.59	0.67	0.57	0.50	0.36	0.64	0.50	0.62	0.51	0.56	0.54	0.63	0.29	0.56	0.32	0.52	0.47	0.68	0.50	0.68	0.51	0.37	0.62	0.44	0.56	0.54	0.46	0.13	0.33	0.65	0.49	0.44	0.49	***iRE***			
	Speciality & Other Finance	iSF	0.53	0.62	0.71	0.76	0.66	0.62	0.53	0.71	0.67	0.73	0.69	0.65	0.61	0.65	0.39	0.52	0.36	0.58	0.47	0.65	0.67	0.73	0.69	0.44	0.70	0.48	0.69	0.63	0.47	0.13	0.72	0.83	0.68	0.59	0.64	0.61	***iSF***		
	FTSE Economic Group Avg.		***0.54***		***0.64***				***0.64***				***0.63***		***0.50***							***0.61***						***0.58***		***0.49***				***0.63***							
Information Technology	Information Technology Hardware	iIH	0.39	0.55	0.60	0.61	0.51	0.59	0.54	0.70	0.77	0.62	0.54	0.63	0.42	0.43	0.32	0.48	0.16	0.45	0.32	0.57	0.57	0.58	0.71	0.44	0.50	0.44	0.70	0.47	0.34	0.05	0.51	0.64	0.62	0.50	0.59	0.55	0.59	***iIH***	
	Software & Computer Services	iSC	0.32	0.46	0.53	0.46	0.44	0.49	0.55	0.56	0.70	0.53	0.51	0.51	0.37	0.35	0.37	0.38	0.22	0.38	0.21	0.41	0.53	0.53	0.68	0.48	0.41	0.43	0.67	0.37	0.29	0.13	0.62	0.52	0.57	0.47	0.56	0.32	0.51	0.69	***iSC***
	FTSE Economic Group Avg.		***0.43***		***0.53***				***0.62***				***0.55***		***0.35***							***0.53***						***0.56***		***0.35***				***0.54***						***0.69***	

Notes: [1] Discontinues on December 31, 2001; [2] Discontinues on December 31, 2002; and, [3] Available since January 1, 2003. :

Appendix B.10

Candidate Datasets Available on Datastream

Provided that the focus of this thesis is a comparative study on the importance of industry factors in national stock markets, an ideal candidate dataset should at least possess following merits: (1) A consistent and well-accepted industry classification system employed by the data provider to group its constituent companies; (2) a wide coverage of countries and constituent companies in both developed and emerging stock markets; and, (3) the data history available for inspection should be long enough to capture the evolution of two factors.[84]

In some stock markets, foreign investors are restricted to trade on a subset of all listed companies. This restriction is quite common among emerging stock markets (ESMs). For example, in China, foreign investors are only allowed to trade those shares listed under the title of "B" or "H." Whereas, "A" shares, which seize a significant amount of market capitalization of all listed stocks, are technically only available for Chinese nationals. Thus, together with the above principles, several other nontrivial issues should also be considered, including liquidity, investibility, non-public holdings, currency convertibility, and cross-ownership.

Guided by the above searching criteria, three potential candidate datasets are thereby targeted to be used in this thesis.[85] They are the Datastream Global Indices, the MSCI All Country Sector Indices, and the FTSE All-World Index Series$^{TM/SM}$.

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[84] Roll (1992, p.5) argues that the nature of the study does not require a long history because of the instability of the international industrial structure over a long time.

[85] IFC/S&P Emerging Markets Database (EMDB) are also available on Datastream, which is a popular choice among researchers as a master database for analysis on, and practitioners as benchmarks for, the performance of emerging stock markets (ESMs). In this dissertation, however, the dataset is not suitable choice because:

1) In this dataset, only emerging stock markets are included. Given the focus of this dissertation on examining the role of industry factor within each national stock market, an analysis without the participation of the developed countries would be biased towards country factor as most of industries within ESMs are more vulnerable to the deterioration of their domiciled country's fundamentals (most of them are persistent) than to the industry level shocks which tend to be short-lived. Furthermore, most of these industry level shocks/innovations are from the same or related industries within developed countries that host developed stock markets. As a result, we have to collect data from another database provider, such as MSCI, for developed stock markets, which could possibly use different industry classification system. This approach violates the consistency criterion.

Datastream Global Indices is the most comprehensive dataset among the three. It draws on the forte of the Datastream's current coverage of 40 major stock markets and a sample of almost 6000 companies.[86] Its coverage traces back as far as January 1965 for the UK and for other developed markets, from 1975. It divides its universe of securities into different industries follows the standard put forward by the FTSE/Actuaries, which was issued in January 1994. Besides, Datastream further refines its industry classification into a number of detailed sub-industries as defined by London Stock Exchange, which completes its six-level industry classification system for its universe of securities. Datastream Global Indices is available in both "fixed history indices" and "recalculated indices." For the former set of indices, they are not recalculated historically when its constituents change and hence enable the effects of "dead stocks" to be seen on the index. In contrast to fixed history indices, "recalculated indices" are *recalculated* historically to show the long term performance of an index's current constituents and thus to avoid distortions by stocks entering or leaving a sector. The survivorship bias, however, will exist in this set of recalculated index as a result of using its current constituents only.

However, the use of Datastream Global Indices also has its tradeoffs. First of all, despite its wide coverage within a given market, it does not screen for investibility using

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2) Industry indices are not available for IFC EMDB as provided by Datastream. Only national and regional level indices (Global and Investable) are supplied. Thus, we do not know exactly which industries are presented in subject countries.
3) Identity of constituent companies within each country's index is not available to us. Consequently, we cannot manually construct industry indices, which are the key to this dissertation. Even if we had obtained historic constituent stocks lists, however, given that some of the component stocks could have been delisted or the staple line of business of a given company were changing over time, the industry indices thus obtained would be error-ridden, which in turn would possibly bias our results if the market capitalization of that company is large comparative to other companies within the same industry. If we use current constituent stocks, issues like survivorship bias, could also jeopardize our results regarding the industry factor because the survived companies are more adaptive to the industry shocks than the country factor, which tends to affect all industries within that country.
4) During the time when collecting data for this dissertation, the current owner of the EMDB, Standard & Poor's, was introducing a new industry classification system for its constituent companies, i.e., the Global Industry Classification Standard (or, GICS ® in shorthand). The industry indices were only available for a quite short history at Datastream on a trial base.

Upon the above reasons, this dataset is dropped from consideration.

[86] This database is the first choice under our consideration. As the focus of this dissertation is on examining the roles of industry factors, the forte of the results will come from a comprehensive coverage of companies across industries within a market to capture the swings of the industry factors. Unfortunately, this could also be one of the disadvantages because several nontrivial issues, like cross-holdings, are not considered when Datastream construct this database.

measures such as liquidity, foreign access regulations, non-public holdings, currency convertibility and cross-ownership issues. Thus, some of the constituent securities are inaccessible for foreign investors. This will distort the performance for a given country's stock market from the perspective of foreign investors. Second, its cross-sectional constituent lists for securities covered in each industry are not available, although it is claimed in the handbook for Datastream that it should be ready for downloading. When turning to industry indices for each market, frustratingly, we find that there are several nontrivial mistakes due to data entering mistakes. For example, when requesting the data for Media and Entertainment industry at level 4 for Argentina (DS: MEDIAAR), we obtain Australia's data instead. At level 5, when downloading the data for Internet industry in Germany (DS: INTNTBD), surprisingly, it is found that there is no data at all. Yet, when checking the latest constituent list as provided by Datastream for German Internet industry (Level 5), it is found that there are four constituent companies, which have their data history back as early as 1994. Not to mention that, in several cases, there is data available for the corresponding industry but without its downloading mnemonic.

Given the fact that Datastream Global Indices does not pass our integrity test, this thesis has switched to the second candidate, the MSCI All Country Sector (ACS) Indices as provided by Morgan Stanley Capital International (MSCI).

MSCI All Country Sector (ACS) Indices is a popular index product closely followed by investment practitioners as well as academics. Launched in April 2000, MSCI ACS indices are based on the MSCI and S&P Global Industrial Classification Standard (GICS). It covers 51 major stock markets and further classifies its constituent companies into 10 sectors, 23 industry groups and 59 industries accordingly. Data history is available back to December 31, 1994. Unfortunately, until the cutting off date for data collection, i.e., June 30, 2003, the GICS industry indices are not available on Datastream.

Consequently, we turn to the third candidate dataset—FTSE All-World Index Series$^{TM/SM}$.

APPENDIX C

Appendices to Chapter V

Appendix C.1

Summary Statistics of Value-Weighted World Benchmark Return, "Pure" Industry Factors (Estimated from 39 FTSE Industry Sectors) and "Pure" Country Factors (January 1994 - June 2003)

This table reports summary statistics for the value-weighted world benchmark return, "pure" industry factors and "pure" country factors, estimated from industry returns of FTSE Industry Sector Indices within each market via a dummy variable regression model of Heston and Rouwenhorst (1994), during the full sample period, i.e., January 1994 – June 2003. Along with the conventional measures, such as means and standard deviations, we also provide three robust measures of location, i.e., medians, trimmed means with 1% and 5% of extreme observations at both ends of a sorted data series removed. Median absolute deviation is also provided as a robust measure of the dispersion of the data. Sharpe ratio is computed as a ratio of mean and standard deviation. We use it as a measure of risk-adjusted risk premia for the corresponding factor loadings for industry and country factors. Panel A summarizes the estimated value-weighted world benchmark return and industry factors. Panel B summarizes the estimated country factors. In Panel B, the column under "Developed (Emerging) Markets Only" is a summary for estimated country factors from the DSM group and ESM group respectively. "Avg. Abs. Industry (Country) Effect across 39 FTSE Industry Sectors (Markets)" is computed as an average of absolute factors across 39 FTSE Industry Sectors (markets) within each group. All statistics are expressed in % per annum.

Panel A: World Benchmark Return and "Pure" Industry Factors (Estimated from Industry Returns on 39 FTSE Industry Sector Indices in Each Market)

		All Sample Markets							Developed Markets Only							Emerging Markets Only						
		Mean	Stdev	Sharpe Ratio	Median	Trimmed Mean (1%)	Trimmed Mean (5%)	Median Abs. Deviations	Mean	Stdev	Sharpe Ratio	Median	Trimmed Mean (1%)	Trimmed Mean (5%)	Median Abs. Deviations	Mean	Stdev	Sharpe Ratio	Median	Trimmed Mean (1%)	Trimmed Mean (5%)	Median Abs. Deviations
Cap-weighted World Benchmark Return		4.44	17.20	0.26	7.89	4.44	4.83	13.84	-0.21	18.00	-0.01	5.50	-0.17	0.71	14.77	-11.48	22.74	-0.50	-0.34	-9.65	-6.17	18.87
Resource	Mining	-11.23	39.85	-0.28	-6.70	-9.50	-9.42	24.45	-1.05	29.93	-0.04	-12.75	-1.99	-5.90	27.27	-11.40	36.60	-0.31	-13.01	-9.76	-10.13	23.55
	Oil & Gas	19.99	27.34	0.73	12.40	13.81	12.28	17.27	9.00	28.95	0.31	0.96	3.44	-0.31	18.55	20.92	28.39	0.74	14.30	13.72	12.78	18.89
Basic Industries	Chemicals	4.31	22.43	0.19	0.23	4.72	4.50	16.07	1.85	21.80	0.08	6.53	3.99	3.80	16.12	4.05	24.57	0.16	2.33	4.20	3.26	17.62
	Construction & Building Materials	-4.22	23.95	-0.18	-4.31	-8.09	-5.32	16.15	-2.25	23.46	-0.10	-5.78	-2.38	-2.80	21.14	-4.20	25.39	-0.17	-2.06	-7.69	-6.60	15.80
	Forestry & Paper Products	17.67	28.63	0.62	13.36	17.56	17.01	19.02	-2.57	22.95	-0.11	-3.44	-5.40	-7.06	19.88	19.83	31.32	0.63	15.98	20.36	19.43	22.47
	Steel & Other Metals	14.68	30.84	0.48	-2.15	7.07	4.29	19.36	17.00	36.24	0.47	5.47	10.41	9.29	18.24	12.69	30.79	0.41	3.80	5.90	3.54	20.09
General Industries	Aerospace & Defence	-3.91	28.99	-0.13	-3.60	-1.07	-2.17	21.89	-11.03	37.43	-0.29	-6.69	-6.83	-7.28	23.89	4.84	33.02	0.15	-10.32	3.75	0.95	28.28
	Diversified Industrials	-13.74	26.91	-0.51	-7.70	-15.45	-15.23	19.70	-1.49	14.91	-0.10	-1.67	-1.01	-1.74	11.44	-14.57	30.06	-0.48	-6.83	-16.54	-16.40	22.62
	Electronic & Electrical Equipment	-4.95	26.03	-0.19	-19.40	-6.74	-9.56	20.56	-1.66	25.99	-0.06	-7.72	-3.25	-3.36	20.45	-4.30	30.17	-0.14	-18.20	-6.82	-9.86	22.15
	Engineering & Machinery	-10.78	34.71	-0.31	-0.95	-11.97	-11.28	19.96	2.97	23.01	0.13	4.60	3.28	3.58	15.69	-13.31	38.51	-0.35	2.41	-15.11	-14.34	20.59
Cyclical Consumer Goods	Automobiles and Parts	1.89	24.82	0.08	0.75	2.13	1.66	18.29	-11.59	30.62	-0.38	-18.72	-10.53	-13.33	22.87	3.00	28.20	0.11	0.66	4.36	2.58	19.34
	Household Goods & Textiles	-7.05	24.47	-0.29	0.20	-7.41	-6.26	20.64	4.63	23.73	0.19	4.71	3.35	4.20	16.86	-7.23	28.64	-0.25	1.97	-8.56	-7.53	23.30
Non-Cyclical Consumer Goods	Beverages	14.12	20.46	0.69	7.59	11.97	10.58	17.73	8.44	20.93	0.40	3.66	8.70	8.77	16.72	15.96	21.96	0.73	15.76	13.70	11.81	19.07
	Food Producers & Processors	9.16	22.73	0.40	2.67	9.42	8.57	16.12	3.75	26.02	0.14	-4.16	4.70	1.19	17.80	11.45	23.38	0.49	9.27	11.19	10.47	18.52
	Health	0.16	22.77	0.01	-3.03	-2.15	-1.37	16.48	2.36	20.38	0.12	3.24	1.38	2.22	16.25	41.88	42.78	0.98	-1.59	41.88	10.01	30.61
	Packaging	1.71	27.39	0.06	-5.67	2.39	0.84	20.81	-2.46	25.11	-0.10	-10.97	-4.54	-7.20	18.63	1.86	33.73	0.06	-1.86	2.11	1.11	27.52
	Personal Care & Household Products	2.10	25.11	0.08	5.25	3.83	3.57	17.09	6.95	21.58	0.32	4.08	7.22	6.94	16.62	0.16	38.22	0.00	3.13	1.81	0.67	30.25
	Pharmaceuticals	13.65	39.98	0.34	-0.54	9.53	3.43	21.77	-2.91	23.05	-0.13	0.80	-1.52	-1.13	19.07	13.18	45.75	0.29	-1.37	8.02	1.01	25.71
	Tobacco	13.65	31.33	0.44	12.49	12.14	12.58	23.12	18.86	24.24	0.78	18.85	19.03	19.89	19.94	12.39	37.26	0.33	13.27	9.62	9.96	30.05
Cyclical Services	Distributors	-9.05	41.91	-0.22	5.64	-6.55	-5.15	28.81	1.99	24.01	0.08	1.28	2.60	4.15	15.89	-15.46	55.08	-0.28	7.90	-13.15	-11.03	42.05
	General Retailers	0.42	33.02	0.01	-15.96	-5.54	-10.48	22.32	2.06	28.00	0.07	-2.41	-2.75	-1.64	18.27	-0.21	38.92	-0.01	-15.81	-8.09	-13.31	25.26
	Leisure, Entertainment & Hotels	-5.23	31.57	-0.17	-3.93	-5.96	-7.30	21.13	9.54	18.98	0.50	8.27	7.31	7.30	14.81	-15.12	37.89	-0.40	-19.21	-16.84	-20.12	24.83
	Media & Photography	7.96	35.68	0.22	3.03	6.44	3.19	26.83	6.92	19.46	0.36	8.73	8.12	8.62	17.11	3.64	39.82	0.09	1.81	1.42	-1.32	29.53
	Support Services	-27.88	32.49	-0.86	-9.94	-24.00	-20.87	21.53	-20.89	33.07	-0.63	-8.05	-19.40	-16.55	20.55	-45.42	53.60	-0.85	-37.69	-33.82	-29.72	38.96
	Transport	-6.19	36.29	-0.17	-3.70	-2.10	-0.74	19.30	-9.56	21.12	-0.45	-8.23	-8.32	-7.73	16.56	-7.02	37.74	-0.19	-5.77	-2.45	-2.70	21.06
Non-Cyclical Services	Food & Drug Retailers	2.15	33.42	0.06	-6.56	-4.90	-4.31	20.80	17.55	25.62	0.69	13.89	15.87	13.66	19.28	-2.75	41.05	-0.07	-15.85	-9.43	-9.11	22.85
	Telecommunication Services	8.41	16.79	0.50	5.26	8.70	8.32	14.17	0.56	15.71	0.04	-5.46	0.49	-0.17	12.70	9.26	15.93	0.58	2.43	9.83	7.52	14.69
Utilities	Electricity	-2.39	24.01	-0.10	1.51	-2.82	-2.44	16.17	4.63	16.56	0.28	2.59	4.87	2.81	13.65	-3.14	23.91	-0.13	-1.98	-3.43	-3.27	16.55
	Gas Distribution	-2.17	30.08	-0.07	0.35	-4.26	-6.73	23.32	8.38	17.25	0.49	5.50	8.98	8.40	15.29	-1.30	33.54	-0.04	-8.10	-3.20	-6.13	27.95
	Water	1.79	33.24	0.05	12.97	1.43	1.02	30.51	-2.00	30.93	-0.06	6.27	-3.22	-1.62	24.75	28.58	43.60	0.66	12.09	28.58	16.00	47.20
	Utilities, Others	14.63	15.88	0.92	26.19	14.63	14.66	13.07	4.49	16.95	0.26	-7.83	4.49	-1.13	18.90	4.74	20.20	0.23	27.61	4.74	3.10	14.83
Financials	Banks	0.23	21.21	0.01	6.01	-0.91	-0.55	16.04	9.71	14.52	0.67	10.48	9.26	7.82	9.38	0.20	21.11	0.01	-0.63	-0.40	0.64	16.92
	Insurance	14.30	23.38	0.61	7.38	13.35	11.13	18.04	8.26	22.91	0.36	10.06	9.96	11.10	17.64	13.52	25.87	0.52	11.85	12.71	11.06	21.78
	Life Assurance	-9.50	27.63	-0.34	-4.93	-7.76	-5.44	19.24	4.66	24.64	0.19	5.72	6.61	7.24	17.61	-14.49	29.78	-0.49	-9.39	-10.55	-8.15	19.38
	Investment Companies	2.65	22.53	0.12	-5.42	1.14	0.66	18.30	2.73	23.34	0.12	-7.76	1.90	-0.45	16.17	1.68	26.39	0.06	-6.05	-0.34	-1.03	21.36
	Real Estate	3.74	71.91	0.05	-3.89	0.26	-0.65	21.41	-16.87	72.49	-0.23	-12.70	-1.50	-4.08	15.67	18.49	63.98	0.29	2.23	1.49	-0.92	21.53
	Speciality & Other Finance	-14.67	28.84	-0.51	-11.10	-10.84	-9.73	17.82	-4.69	27.54	-0.17	-4.96	2.45	0.67	17.06	-17.19	31.39	-0.55	-10.77	-12.74	-12.15	20.34
Information Technology	Information Technology Hardware	-16.20	28.59	-0.57	-14.79	-17.47	-19.79	23.41	-19.53	40.34	-0.48	-38.69	-28.08	-29.50	25.07	-15.90	33.18	-0.48	-14.64	-15.34	-17.42	27.60
	Software & Computer Services	-16.03	39.45	-0.41	-13.61	-10.52	-11.07	27.29	-1.02	31.97	-0.03	1.60	0.08	1.12	27.02	-18.76	45.30	-0.41	-11.91	-12.68	-12.30	33.92
Avg. Abs. Industry Effect Across All Sectors		**8.58**	**29.66**	**0.31**	**6.95**	**7.86**	**7.29**	**20.15**	**6.89**	**25.79**	**0.27**	**7.57**	**6.39**	**6.30**	**18.23**	**11.64**	**34.03**	**0.34**	**9.28**	**10.42**	**8.70**	**24.23**

Panel B: "Pure" Country Factors

Group	Sub-group	Country	All Sample Markets: Mean	Stdev	Sharpe Ratio	Median	Trimmed Mean (1%)	Trimmed Mean (5%)	Median Abs. Deviations	Developed (Emerging) Markets Only: Mean	Stdev	Sharpe Ratio	Median	Trimmed Mean (1%)	Trimmed Mean (5%)	Median Abs. Deviations
DSM	*G7*	Canada	4.49	19.83	0.23	8.08	3.34	5.34	16.14	6.13	17.32	0.35	10.89	5.81	6.25	14.23
		United States	0.80	9.03	0.09	-0.26	1.19	1.37	7.91	0.86	12.05	0.07	2.56	2.55	2.78	7.15
		France	6.38	20.71	0.31	1.33	6.62	6.43	18.23	5.62	17.65	0.32	4.18	5.78	6.45	15.81
		Germany	9.37	20.59	0.46	11.87	8.23	8.27	17.96	6.67	18.93	0.35	5.01	6.45	7.15	16.10
		United Kingdom	2.16	25.15	0.09	-3.84	3.81	4.97	21.10	4.62	24.24	0.19	4.56	7.38	6.81	19.52
		Italy	4.28	22.70	0.19	1.38	4.42	4.94	21.84	3.49	22.84	0.15	0.52	4.13	4.28	19.82
		Japan	-4.39	22.71	-0.19	-5.65	-5.99	-6.53	18.11	-6.00	22.39	-0.27	-11.88	-7.76	-11.45	18.92
	Asia/ Australasia	Australia	11.15	28.75	0.39	5.77	4.31	3.71	18.83	9.39	23.89	0.39	7.84	4.17	3.75	16.26
		New Zealand	6.13	38.51	0.16	10.93	3.03	5.76	20.23	7.89	29.05	0.27	14.94	5.26	8.17	20.38
		Hong Kong/China	-10.24	37.52	-0.27	-4.15	-11.92	-7.49	24.04	-9.71	33.49	-0.29	-4.91	-8.96	-5.54	22.55
		Singapore	-9.58	36.11	-0.27	-8.35	-9.35	-9.69	24.35	-5.97	32.97	-0.18	-5.30	-6.09	-6.54	22.25
	Group Avg. Abs. Country Effect		***6.27***	***25.60***	***0.24***	***5.60***	***5.66***	***5.86***	***18.98***	***6.03***	***23.16***	***0.26***	***6.60***	***5.85***	***6.29***	***17.54***
ESM	*Advanced*	Brazil	-37.53	51.32	-0.73	-15.32	-29.66	-20.81	32.24	-20.76	44.24	-0.47	3.19	-12.88	-4.21	26.60
		Mexico	-19.64	42.17	-0.47	-21.75	-19.48	-19.08	28.68	-2.76	36.51	-0.08	-4.12	-1.96	-4.70	28.64
		Israel	-2.15	29.52	-0.07	0.68	-3.04	-1.14	23.97	13.58	31.35	0.43	19.73	13.13	14.98	25.40
		Korea	-0.07	62.09	0.00	0.24	-7.55	-10.35	37.73	16.17	56.67	0.29	12.08	8.38	3.00	35.18
		Taiwan	-19.05	35.10	-0.54	-18.06	-15.54	-16.30	27.87	-3.98	35.65	-0.11	-6.22	1.68	-0.17	26.28
		South Africa	-1.99	32.04	-0.06	1.57	-3.31	-0.20	25.22	14.10	27.45	0.51	15.58	11.68	12.80	22.87
	Asia	India	-0.06	37.72	0.00	-5.34	-5.35	-8.38	30.38	15.52	38.83	0.40	7.26	12.33	11.71	31.61
		Pakistan	-8.50	43.87	-0.19	-5.00	-7.39	-5.48	38.99	8.01	41.92	0.19	16.65	8.70	11.06	35.93
		China	-0.41	42.18	-0.01	-8.46	-3.49	-6.98	33.15	14.15	44.19	0.32	8.38	10.96	9.12	34.30
		Indonesia	-30.09	81.71	-0.37	1.22	-33.47	-25.67	43.99	-10.78	76.27	-0.14	16.62	-14.24	-10.98	39.42
		Malaysia	-2.77	38.09	-0.07	-5.09	-3.71	-3.72	29.27	14.32	34.31	0.42	8.07	12.52	10.68	25.44
		Philippines	-52.22	61.66	-0.85	-50.86	-55.88	-61.60	43.77	-33.53	58.09	-0.58	-40.00	-37.59	-44.93	45.56
		Thailand	-4.54	49.86	-0.09	-6.65	-15.15	-16.32	36.61	13.31	46.17	0.29	12.93	6.15	1.71	34.30
	Europe	Czech Republic	-17.59	38.71	-0.45	3.48	-17.45	-17.22	36.58	1.86	40.29	0.05	0.57	1.37	0.99	36.45
		Hungary	-12.05	38.66	-0.31	4.35	-9.89	-5.74	28.64	8.90	39.35	0.23	33.74	9.75	15.55	31.51
		Poland	-8.65	38.75	-0.22	-11.68	-8.35	-8.48	32.72	7.24	38.47	0.19	12.89	8.02	7.82	32.19
		Turkey	-8.83	61.20	-0.14	4.85	-3.30	4.05	48.50	7.15	61.36	0.12	26.82	12.37	20.64	48.84
		Russia	2.28	99.59	0.02	18.72	6.76	11.23	54.72	25.83	94.02	0.27	34.96	30.82	35.16	51.24
	Lat. America	Argentina	-12.40	45.02	-0.28	-29.42	-13.05	-18.30	34.20	-1.59	40.41	-0.04	-8.76	-0.80	-5.71	31.00
		Chile	-6.54	27.92	-0.23	-23.28	-7.39	-10.12	23.61	10.35	27.86	0.37	2.44	10.77	7.33	23.18
		Colombia	-19.65	36.10	-0.54	-14.27	-21.13	-22.88	28.49	-3.47	36.56	-0.09	-10.62	-4.04	-4.64	30.31
		Peru	6.51	33.46	0.19	6.08	6.72	3.86	24.82	21.68	33.24	0.65	17.32	20.80	21.66	25.40
	Group Avg. Abs. Country Effect		***12.43***	***46.67***	***0.27***	***11.65***	***13.50***	***13.54***	***33.82***	***12.23***	***44.69***	***0.28***	***14.50***	***11.41***	***11.80***	***32.80***
Avg. Abs. Country Effect Across All Markets			**10.38**	**39.65**	**0.26**	**9.64**	**10.89**	**10.98**	**28.88**	-	-	-	-	-	-	-

Appendix C.2

Time Series Regression (OLS) of Excess Country Index Return (U.S. Dollar-Denominated) on Excess World Market Index Return, Value-Weighted [Cumulative] Industry and Country Factors, All Sample [Stock] Markets (January 1994 – June 2003)

This table reports the estimated coefficients for each factor, i.e., a world market factor (FTSE), a country factor (CNT) and a value-weighted [cumulative] industry factor (IND), from the OLS regression for each country. Newey and West (1987) heteroscedasticity and autocorrelation consistent (HAC) standard errors are reported for each coefficient (in square brackets), along with some residual diagnostics for four time series regression models specified for each country. Four time series regressions models are: (1) ICAPM: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t}$; (2) ICAPM + Country Effect: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t} +$ [Country Factor]$_{k,t}$; (3) ICAPM + Cum. Industry Factors: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t} +$ [Cum. Industry Effect]$_{k,t}$; and, (4) ICAPM + Country Effect + Cum. Industry Factors: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t} +$ [Country Effect]$_{k,t}$ + [Cum. Industry Effect]$_{k,t}$. ICAPM model is used as the benchmark model. r_k (r_{FTSE}) is the weekly excess return of country k (a world market portfolio) above a one-week Eurodollar deposit rate; country and value-weighted cumulative industry factors are estimated from a dummy variable regression model of Heston and Rouwenhorst (1994) via industry returns on all available FTSE Industry Sector indices in all sample markets (33). Cap-weights are computed by using market capitalization at the beginning of the synthetic week (Wednesday-to-Wednesday) for each available Industry Sector index within each market. Adjusted (Adj.) R^2 is reported for each model specification in each country as an indicator of the explanatory power of that model. Residual diagnostics are also reported: Jarque-Bera statistic (JB-stat) is indicative of normality of the residuals; and, Ljung-Box statistic (LB-stat) tests for the serial correlation in the residuals. Significance at the 1% level is denoted by ***, at the 5% level by **, and at the 10% level by *.

Group	Sub-group	Country	ICAPM				Country Effect					Cumulative Industry Effects					Country Effect + Cumulative Industry Effects					
			FTSE	Adj. R-sq.	JB-stat	LB-stat	FTSE	CNT	Adj. R-sq.	JB-stat	LB-stat	FTSE	IND	Adj. R-sq.	JB-stat	LB-stat	FTSE	CNT	IND	Adj. R-sq.	JB-stat	LB-stat
DSM	G7	Canada	0.914***	0.583	56.506***	32.080	0.930***	0.196***	0.627	127.384***	35.497	0.914***	0.023	0.582	56.637***	31.941	0.929***	0.199***	-0.064	0.626	129.217***	35.881*
			[0.042]				[0.039]	[0.031]				[0.042]	[0.095]				[0.038]	[0.031]	[0.082]			
		United States	1.062***	0.858	3.231	38.922**	1.059***	0.374***	0.895	1.058	42.727**	1.063***	-0.059	0.858	3.055	38.912**	1.065***	0.393***	-0.377***	0.897	1.252	40.396**
			[0.022]				[0.020]	[0.034]				[0.023]	[0.138]				[0.021]	[0.036]	[0.122]			
		France	1.092***	0.607	42.206***	51.446***	1.085***	0.317***	0.700	29.304***	39.878**	1.088***	-0.139	0.607	42.751***	52.589***	1.078***	0.319***	-0.216	0.701	29.141***	39.571**
			[0.068]				[0.053]	[0.044]				[0.070]	[0.133]				[0.055]	[0.044]	[0.179]			
		Germany	1.214***	0.637	22.834***	39.065**	1.173***	0.298***	0.705	24.668***	29.530	1.215***	-0.037	0.637	23.314***	39.663**	1.174***	0.298***	-0.053	0.705	24.912***	30.208
			[0.066]				[0.053]	[0.038]				[0.066]	[0.095]				[0.053]	[0.038]	[0.090]			
		United Kingdom	0.858***	0.617	28.565***	50.988***	0.831***	0.153***	0.669	44.223***	34.397	0.866***	0.186*	0.621	28.755***	50.437***	0.836***	0.150***	0.086	0.669	43.813***	35.399
			[0.046]				[0.040]	[0.019]				[0.046]	[0.095]				[0.041]	[0.020]	[0.086]			
		Italy	1.006***	0.383	32.346***	28.421	0.961***	0.528***	0.614	2.825	26.888	1.005***	-0.047	0.382	32.020***	28.315	0.953***	0.538***	-0.232***	0.619	3.258	27.270
			[0.063]				[0.058]	[0.043]				[0.063]	[0.111]				[0.059]	[0.043]	[0.082]			
		Japan	0.732***	0.258	92.823***	34.872	0.893***	0.624***	0.661	7.433**	24.404	0.732***	0.068	0.257	87.929***	34.793	0.894***	0.625***	-0.125	0.661	8.298**	24.143
			[0.083]				[0.041]	[0.043]				[0.083]	[0.264]				[0.041]	[0.043]	[0.166]			
	Asia/ Australasia	Australia	0.633***	0.327	10.455***	28.449	0.689***	0.133	0.374	419.809***	33.791	0.632***	-0.012	0.325	10.750***	28.255	0.685***	0.137	-0.065	0.374	481.800***	32.091
			[0.050]				[0.055]	[0.101]				[0.051]	[0.063]				[0.054]	[0.105]	[0.077]			
		New Zealand	0.535***	0.157	40.707***	53.254***	0.558***	0.152***	0.237	27.912***	49.094***	0.532***	-0.059	0.156	40.434***	53.086***	0.558***	0.152***	0.001	0.235	27.916***	49.090***
			[0.078]				[0.070]	[0.042]				[0.079]	[0.096]				[0.071]	[0.042]	[0.092]			
		Hong Kong/China	0.924***	0.267	151.960***	30.486	0.937***	0.284***	0.417	192.856***	33.706	0.924***	-0.003	0.265	152.014***	30.536	0.939***	0.287***	0.054	0.418	194.665***	33.680
			[0.081]				[0.066]	[0.075]				[0.081]	[0.043]				[0.066]	[0.074]	[0.058]			
		Singapore	0.803***	0.177	168.568***	33.393	0.800***	0.493***	0.553	160.082***	30.415	0.803***	0.048	0.176	167.729***	33.294	0.798***	0.497***	-0.140	0.554	129.454***	30.007
			[0.098]				[0.059]	[0.050]				[0.098]	[0.127]				[0.058]	[0.047]	[0.126]			

(Appendix C.2 - *Continued*)

Group	Sub-group	Country	ICAPM				Country Effect					Cumulative Industry Effects					Country Effect + Cumulative Industry Effects					
			FTSE	Adj. R-sq.	JB-stat	LB-stat	FTSE	CNT	Adj. R-sq.	JB-stat	LB-stat	FTSE	IND	Adj. R-sq.	JB-stat	LB-stat	FTSE	CNT	IND	Adj. R-sq.	JB-stat	LB-stat
ESM	*Advanced*	Brazil	1.242***	0.193	877.580***	43.007**	1.214***	0.463***	0.478	388.514***	44.245**	1.225***	-0.171	0.193	875.285***	42.827**	1.209***	0.462***	-0.048	0.477	382.919***	43.978**
			[0.222]				[0.151]	[0.068]				[0.223]	[0.165]				[0.150]	[0.069]	[0.171]			
		Mexico	1.195***	0.245	333.586***	40.091**	0.948***	0.612***	0.726	1950.463***	35.998*	1.196***	0.010	0.244	333.424***	40.147**	0.962***	0.620***	0.330**	0.732	1745.627***	34.941
			[0.107]				[0.058]	[0.059]				[0.108]	[0.137]				[0.060]	[0.055]	[0.132]			
		Israel	0.651***	0.150	26.419***	21.653	0.700***	0.618***	0.657	371.016***	33.123	0.650***	0.011	0.148	26.372***	21.716	0.697***	0.619***	0.044	0.656	385.932***	34.474
			[0.068]				[0.050]	[0.050]				[0.069]	[0.099]				[0.050]	[0.050]	[0.068]			
		Korea	1.222***	0.179	397.509***	67.556***	1.106***	0.432***	0.548	13788.104***	31.052	1.222***	-0.011	0.177	396.689***	67.398***	1.112***	0.433***	-0.132	0.548	13102.634***	29.514
			[0.136]				[0.083]	[0.132]				[0.137]	[0.188]				[0.084]	[0.130]	[0.172]			
		Taiwan/China	0.737***	0.126	36.257***	15.459	0.872***	0.536***	0.474	861.251***	35.840*	0.713***	0.258**	0.135	33.317***	15.474	0.840***	0.546***	0.375***	0.496	456.105***	34.319
			[0.083]				[0.073]	[0.098]				[0.084]	[0.101]				[0.075]	[0.087]	[0.137]			
		South Africa	0.711***	0.178	160.616***	39.007**	0.810***	0.435***	0.468	244.322***	26.330	0.721***	0.076	0.179	148.693***	37.151*	0.810***	0.435***	>0.000	0.467	244.319***	26.330
			[0.082]				[0.065]	[0.070]				[0.082]	[0.087]				[0.065]	[0.071]	[0.075]			
	Asia	India	0.275***	0.021	21.893***	32.778	0.604***	0.486***	0.421	4242.933***	32.759	0.276***	-0.062	0.019	21.804***	33.133	0.610***	0.510***	0.477**	0.437	3265.490***	33.762
			[0.088]				[0.069]	[0.102]				[0.088]	[0.195]				[0.068]	[0.094]	[0.205]			
		Pakistan	0.112	0.000	105.850***	28.607	0.632***	0.783***	0.752	68.554***	31.178	0.104	-0.120	-0.001	110.936***	29.554	0.701***	0.825***	0.686***	0.786	19.689***	23.462
			[0.112]				[0.060]	[0.030]				[0.110]	[0.238]				[0.054]	[0.029]	[0.114]			
		China	0.253***	0.009	211.808***	33.822	0.694***	0.688***	0.619	10799.932***	22.272	0.268***	0.229	0.013	204.454***	33.760	0.750***	0.712***	0.609***	0.654	6883.627***	25.932
			[0.098]				[0.064]	[0.086]				[0.100]	[0.180]				[0.066]	[0.074]	[0.167]			
		Indonesia	0.521***	0.021	194.825***	29.811	0.659***	0.578***	0.686	1526.530***	37.907**	0.438**	-0.650**	0.043	175.625***	27.627	0.679***	0.584***	0.148	0.686	1287.448***	35.539*
			[0.176]				[0.099]	[0.070]				[0.172]	[0.275]				[0.095]	[0.062]	[0.216]			
		Malaysia	0.498***	0.043	1199.693***	40.572**	0.697***	0.811***	0.771	53.417***	28.441	0.433***	-0.495**	0.059	1315.292***	38.380*	0.690***	0.809***	-0.050	0.771	49.471***	28.493
			[0.104]				[0.058]	[0.044]				[0.097]	[0.219]				[0.057]	[0.043]	[0.129]			
		Philippines	0.515***	0.054	258.800***	32.178	0.587***	0.421***	0.539	67.198***	35.017*	0.506***	-0.103	0.054	255.397***	32.811	0.590***	0.422***	0.034	0.538	66.002***	34.512*
			[0.126]				[0.060]	[0.036]				[0.124]	[0.100]				[0.060]	[0.036]	[0.055]			
		Thailand	1.003***	0.094	75.815***	60.122***	1.044***	0.632***	0.473	982.593***	54.491***	0.996***	-0.112	0.092	72.410***	60.232***	1.071***	0.643***	0.383	0.477	1052.215***	48.019***
			[0.191]				[0.129]	[0.115]				[0.188]	[0.277]				[0.130]	[0.119]	[0.275]			
	Europe	Czech Republic	0.571***	0.106	0.642	34.057	0.741***	0.394***	0.360	0.804	28.954	0.571***	-0.009	0.104	0.602	33.990	0.762***	0.411***	0.277*	0.368	0.784	28.098
			[0.099]				[0.079]	[0.033]				[0.101]	[0.140]				[0.078]	[0.037]	[0.146]			
		Hungary	0.860***	0.229	10.478***	32.275	1.005***	0.460***	0.515	10.908***	27.184	0.865***	0.174	0.229	10.235***	30.503	1.010***	0.460***	0.187	0.517	19.915***	24.132
			[0.120]				[0.090]	[0.040]				[0.120]	[0.163]				[0.088]	[0.041]	[0.251]			
		Poland	0.840***	0.109	592.333***	56.623***	0.897***	0.743***	0.664	57.967***	24.626	0.843***	0.384*	0.118	620.290***	53.433***	0.899***	0.745***	0.426***	0.677	76.857***	19.757
			[0.114]				[0.073]	[0.044]				[0.113]	[0.196]				[0.072]	[0.041]	[0.122]			
		Turkey	1.004***	0.063	50.190***	30.336	0.826***	0.859***	0.821	112.050***	23.369	0.982***	-0.238	0.063	49.939***	31.129	0.817***	0.858***	-0.105	0.821	106.404***	23.630
			[0.228]				[0.087]	[0.017]				[0.234]	[0.257]				[0.087]	[0.018]	[0.198]			
		Russia	1.203***	0.103	100.776***	39.387**	0.916***	0.430***	0.509	200.442***	40.698**	1.149***	-0.338*	0.110	94.193***	40.809**	0.956***	0.453***	0.361*	0.518	226.377***	37.964**
			[0.242]				[0.145]	[0.067]				[0.229]	[0.202]				[0.144]	[0.071]	[0.185]			
	Lat. America	Argentina	0.875***	0.111	314.498***	32.037	0.695***	0.636***	0.620	953.366***	36.309*	0.871***	-0.022	0.109	314.461***	31.930	0.692***	0.636***	-0.017	0.620	936.637***	36.571*
			[0.123]				[0.091]	[0.061]				[0.124]	[0.071]				[0.085]	[0.061]	[0.223]			
		Chile	0.582***	0.133	93.339***	47.624***	0.758***	0.421***	0.355	131.122***	36.246*	0.577***	-0.047	0.132	92.969***	48.434***	0.758***	0.421***	-0.004	0.353	130.755***	36.252*
			[0.065]				[0.060]	[0.052]				[0.066]	[0.093]				[0.063]	[0.053]	[0.072]			
		Colombia	0.218**	0.011	253.088***	48.312***	0.535***	0.691***	0.690	118.700***	35.147	0.221**	0.019	0.009	254.079***	48.343***	0.615***	0.720***	0.462***	0.719	122.710***	30.849
			[0.091]				[0.062]	[0.030]				[0.093]	[0.099]				[0.061]	[0.030]	[0.079]			
		Peru	0.338***	0.029	154.822***	36.678*	0.556***	0.500***	0.339	87.397***	30.449	0.353***	0.118*	0.031	162.875***	34.497	0.612***	0.531***	0.343***	0.367	72.537***	24.188
			[0.090]				[0.084]	[0.070]				[0.088]	[0.070]				[0.078]	[0.064]	[0.080]			

Appendix C.3

Time Series Regression (OLS) of Excess Country Index Return (U.S. Dollar-Denominated) on Excess World Market Index Return, Value-Weighted [Cumulative] Industry and Country Factors, Sub-samples of Developed and Emerging [Stock] Markets (January 1994 – June 2003)

This table reports the estimated coefficients for each factor, i.e., a world market factor (FTSE), a country factor (CNT) and a value-weighted [cumulative] industry factor (IND), from the OLS regression for each country. Newey and West (1987) heteroscedasticity and autocorrelation consistent (HAC) standard errors are reported for each coefficient (in square brackets), along with some residual diagnostics for four time series regression models specified for each country. Four time series regressions models are: (1) ICAPM: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t}$; (2) ICAPM + Country Effect: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t} +$ [Country Effect]$_{k,t}$; (3) ICAPM + Cum. Industry Factors: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t} +$ [Cum. Industry Effect]$_{k,t}$; and, (4) ICAPM + Country Effect + Cum. Industry Factors: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t} +$ [Country Effect]$_{k,t}$ + [Cum. Industry Effect]$_{k,t}$. ICAPM model is used as the benchmark model. r_k (r_{FTSE}) is the weekly excess return of country k (a world market portfolio) above a one-week Eurodollar deposit rate; country and value-weighted industry factors are estimated from a dummy variable regression model of Heston and Rouwenhorst (1994) via industry returns on all available FTSE Industry Sector indices in two sub-samples of markets. Panel A reports the regression results for a sub-sample of developed markets (11); and, Panel B for a sub-sample of emerging markets (22). Cap-weights are computed by using market capitalization at the beginning of each synthetic week (Wednesday-to-Wednesday) for each available Industry Sector index within each market. Adjusted (Adj.) R^2 is reported for each model specification in each country as an indicator of the explanatory power of that model. Residual diagnostics are also reported: Jarque-Bera statistic (JB-stat) is indicative of normality of the residuals; and Ljung-Box statistic (LB-stat) tests for the serial correlation in the residuals. Significance at the 1% level is denoted by ***, at the 5% level by **, and at the 10% level by *.

Panel A: Developed Markets Only

Group	Sub-group	Country	ICAPM				Country Effect					Cumulative Industry Effects					Country Effect + Cumulative Industry Effects					
			FTSE	Adj. R-sq.	JB-stat	LB-stat	FTSE	CNT	Adj. R-sq.	JB-stat	LB-stat	FTSE	IND	Adj. R-sq.	JB-stat	LB-stat	FTSE	CNT	IND	Adj. R-sq.	JB-stat	LB-stat
DSM	G7	Canada	0.914***	0.583	56.506***	32.080	0.907***	0.292***	0.658	123.939***	36.834*	0.915***	0.088	0.583	58.505***	32.234	0.905***	0.303***	-0.118	0.659	106.825***	37.610*
			[0.042]				[0.034]	[0.036]				[0.042]	[0.096]				[0.034]	[0.030]	[0.127]			
		United States	1.062***	0.858	3.231	38.922**	1.066***	0.255***	0.888	3.682	44.100**	1.061***	0.088	0.858	3.543	39.192**	1.072***	0.282***	-0.449***	0.891	0.626	40.696**
			[0.022]				[0.020]	[0.048]				[0.023]	[0.197]				[0.021]	[0.042]	[0.169]			
		France	1.092***	0.607	42.206***	51.446***	1.060***	0.438***	0.736	19.622***	40.639**	1.083***	-0.261	0.609	44.990***	50.469***	1.057***	0.436***	-0.096	0.736	22.303***	40.137**
			[0.068]				[0.051]	[0.047]				[0.070]	[0.187]				[0.054]	[0.046]	[0.181]			
		Germany	1.214***	0.637	22.834***	39.065**	1.163***	0.346***	0.715	35.241***	32.669	1.194***	0.242***	0.642	22.256***	40.063**	1.153***	0.340***	0.135**	0.716	35.230***	33.556
			[0.066]				[0.052]	[0.042]				[0.065]	[0.075]				[0.052]	[0.043]	[0.068]			
		United Kingdom	0.858***	0.617	28.565***	50.988***	0.842***	0.156***	0.668	53.582***	34.114	0.878***	0.216***	0.622	25.304***	56.975***	0.858***	0.153***	0.167**	0.670	46.691***	37.636*
			[0.046]				[0.039]	[0.023]				[0.046]	[0.082]				[0.040]	[0.023]	[0.071]			
		Italy	1.006***	0.383	32.346***	28.421	0.961***	0.529***	0.618	17.548***	33.949	1.016***	0.186*	0.385	35.901***	29.744	0.963***	0.527***	0.045	0.617	17.285***	34.612
			[0.063]				[0.053]	[0.047]				[0.062]	[0.098]				[0.054]	[0.047]	[0.119]			
		Japan	0.732***	0.258	92.823***	34.872	0.892***	0.662***	0.700	10.596***	22.331	0.739***	-0.224	0.259	87.811***	33.323	0.901***	0.663***	-0.283*	0.702	9.103**	23.486
			[0.083]				[0.043]	[0.044]				[0.085]	[0.240]				[0.044]	[0.043]	[0.146]			
	Asia/ Australasia	Australia	0.633***	0.327	10.455***	28.449	0.712***	0.217*	0.414	952.960***	34.963	0.645***	0.126	0.331	8.428**	31.351	0.715***	0.213*	0.048	0.413	861.311***	36.566*
			[0.050]				[0.051]	[0.110]				[0.050]	[0.086]				[0.050]	[0.112]	[0.098]			
		New Zealand	0.535***	0.157	40.707***	53.254***	0.594***	0.307***	0.342	18.730***	50.150***	0.546***	0.072	0.156	41.606***	52.924***	0.677***	0.360***	0.459***	0.380	21.225***	48.889***
			[0.078]				[0.067]	[0.060]				[0.079]	[0.103]				[0.067]	[0.063]	[0.095]			
		Hong Kong/China	0.924***	0.267	151.960***	30.486	0.918***	0.371***	0.472	119.025***	28.036	0.926***	0.023	0.265	148.455***	29.984	0.912***	0.382***	-0.091*	0.476	141.129***	28.578
			[0.081]				[0.054]	[0.069]				[0.081]	[0.060]				[0.053]	[0.073]	[0.053]			
		Singapore	0.803***	0.177	168.568***	33.393	0.862***	0.571***	0.597	33.756***	35.061	0.804***	0.100	0.177	161.486***	32.527	0.862***	0.571***	0.013	0.596	33.365***	35.126
			[0.098]				[0.060]	[0.039]				[0.098]	[0.133]				[0.060]	[0.039]	[0.140]			

Panel B: Emerging Markets Only

Group	Sub-group	Country	ICAPM				Country Effect					Cumulative Industry Effects					Country Effect + Cumulative Industry Effects					
			FTSE	Adj. R-sq.	JB-stat	LB-stat	FTSE	CNT	Adj. R-sq.	JB-stat	LB-stat	FTSE	IND	Adj. R-sq.	JB-stat	LB-stat	FTSE	CNT	IND	Adj. R-sq.	JB-stat	LB-stat
ESM	Advanced	Brazil	1.242***	0.193	877.580***	43.007**	1.190***	0.462***	0.404	369.203***	49.769***	1.248***	0.133	0.192	870.908***	42.982**	1.205***	0.469***	0.414**	0.407	357.675***	53.407***
			[0.222]				[0.177]	[0.083]				[0.223]	[0.244]				[0.177]	[0.084]	[0.197]			
		Mexico	1.195***	0.245	333.586***	40.091**	0.938***	0.624***	0.616	194.793***	44.142**	1.194***	0.079	0.244	332.041***	40.664**	0.938***	0.624***	0.078	0.616	192.279***	43.958**
			[0.107]				[0.091]	[0.060]				[0.107]	[0.165]				[0.092]	[0.059]	[0.152]			
		Israel	0.651***	0.150	26.419***	21.653	0.688***	0.464***	0.471	9.121**	16.855	0.652***	-0.009	0.148	26.284***	21.568	0.685***	0.464***	0.021	0.470	9.982***	17.320
			[0.068]				[0.063]	[0.041]				[0.069]	[0.079]				[0.064]	[0.042]	[0.055]			
		Korea	1.222***	0.179	397.509***	67.556***	1.094***	0.443***	0.502	4541.127***	31.482	1.217***	0.049	0.178	400.053***	68.799***	1.083***	0.443***	0.108	0.501	4932.511***	32.169
			[0.136]				[0.098]	[0.131]				[0.139]	[0.152]				[0.100]	[0.134]	[0.153]			
		Taiwan/China	0.737***	0.126	36.257***	15.459	0.822***	0.362***	0.289	178.444***	22.527	0.705***	0.217**	0.135	30.416***	15.778	0.778***	0.378***	0.317***	0.311	127.153***	19.662
			[0.083]				[0.083]	[0.116]				[0.086]	[0.096]				[0.084]	[0.108]	[0.102]			
		South Africa	0.711***	0.178	160.616***	39.007**	0.789***	0.369***	0.330	161.885***	35.213	0.723***	0.156	0.182	143.307***	35.978*	0.802***	0.370***	0.170*	0.335	147.001***	31.088
			[0.082]				[0.082]	[0.067]				[0.082]	[0.111]				[0.083]	[0.065]	[0.090]			
	Asia	India	0.275***	0.021	21.893***	32.778	0.532***	0.394***	0.302	511.947***	34.304	0.281***	-0.061	0.020	23.152***	32.730	0.518***	0.417***	0.293**	0.314	495.975***	31.507
			[0.088]				[0.084]	[0.083]				[0.086]	[0.123]				[0.082]	[0.082]	[0.116]			
		Pakistan	0.112	0.000	105.850***	28.607	0.601***	0.754***	0.635	157.365***	30.472	0.114	-0.253	0.003	109.268***	29.291	0.623***	0.796***	0.580***	0.658	102.025***	32.214
			[0.112]				[0.071]	[0.036]				[0.111]	[0.196]				[0.071]	[0.036]	[0.126]			
		China	0.253***	0.009	211.808***	33.822	0.606***	0.558***	0.451	2071.540***	37.928*	0.254**	0.225	0.014	208.444***	33.915	0.634***	0.597***	0.639***	0.500	760.828***	47.294***
			[0.098]				[0.083]	[0.093]				[0.099]	[0.158]				[0.092]	[0.075]	[0.206]			
		Indonesia	0.521***	0.021	194.825***	29.811	0.644***	0.602***	0.648	927.991***	30.911	0.508***	-0.241	0.022	189.871***	28.397	0.657***	0.607***	0.216	0.650	756.575***	28.033
			[0.176]				[0.105]	[0.071]				[0.175]	[0.239]				[0.104]	[0.066]	[0.161]			
		Malaysia	0.498***	0.043	1199.693***	40.572**	0.667***	0.781***	0.591	68.262***	48.972***	0.461***	-0.489**	0.059	1333.271***	41.646**	0.644***	0.775***	-0.287**	0.596	68.079***	47.355***
			[0.104]				[0.085]	[0.059]				[0.100]	[0.229]				[0.083]	[0.058]	[0.140]			
		Philippines	0.515***	0.054	258.800***	32.178	0.564***	0.404***	0.451	57.516***	43.859**	0.515***	0.012	0.051	256.126***	31.836	0.567***	0.412***	0.196**	0.458	48.430***	44.153**
			[0.126]				[0.076]	[0.042]				[0.126]	[0.096]				[0.076]	[0.043]	[0.079]			
		Thailand	1.003***	0.094	75.815***	60.122***	1.010***	0.606***	0.393	83.851***	80.418***	1.002***	-0.152	0.093	72.606***	59.970***	1.010***	0.606***	-0.020	0.392	84.323***	80.710***
			[0.191]				[0.154]	[0.074]				[0.190]	[0.265]				[0.153]	[0.074]	[0.261]			
	Europe	Czech Republic	0.571***	0.106	0.642	34.057	0.682***	0.281***	0.246	0.658	38.595**	0.567***	0.246	0.109	0.526	34.415*	0.681***	0.299***	0.463***	0.263	1.751	38.801**
			[0.099]				[0.088]	[0.037]				[0.099]	[0.155]				[0.086]	[0.038]	[0.170]			
		Hungary	0.860***	0.229	10.478***	32.275	0.959***	0.337***	0.387	8.638**	22.128	0.852***	0.206	0.232	9.000**	29.289	0.951***	0.335***	0.182	0.389	11.114***	19.381
			[0.120]				[0.111]	[0.058]				[0.121]	[0.141]				[0.113]	[0.059]	[0.182]			
		Poland	0.840***	0.109	592.333***	56.623***	0.872***	0.667***	0.550	26.994***	30.630	0.821***	0.404**	0.123	614.864***	51.996***	0.855***	0.664***	0.349***	0.560	42.158***	22.990
			[0.114]				[0.097]	[0.054]				[0.112]	[0.181]				[0.097]	[0.052]	[0.105]			
		Turkey	1.004***	0.063	50.190***	30.336	0.823***	0.816***	0.750	70.947***	26.108	0.993***	-0.383	0.065	46.632***	31.006	0.822***	0.815***	-0.049	0.750	68.076***	25.888
			[0.228]				[0.128]	[0.021]				[0.228]	[0.253]				[0.128]	[0.022]	[0.237]			
		Russia	1.203***	0.103	100.776***	39.387**	0.904***	0.426***	0.456	164.897***	37.724**	1.186***	-0.173	0.102	96.571***	40.947**	0.923***	0.446***	0.385**	0.466	184.044***	31.835
			[0.242]				[0.170]	[0.070]				[0.239]	[0.172]				[0.172]	[0.070]	[0.152]			
	Lat. America	Argentina	0.875***	0.111	314.498***	32.037	0.688***	0.648***	0.535	195.735***	27.443	0.875***	-0.004	0.109	314.815***	32.034	0.677***	0.650***	-0.087	0.535	174.278***	27.637
			[0.123]				[0.119]	[0.063]				[0.123]	[0.075]				[0.115]	[0.060]	[0.191]			
		Chile	0.582***	0.133	93.339***	47.624***	0.684***	0.254***	0.212	86.214***	40.958**	0.583***	0.040	0.132	90.816***	46.930***	0.686***	0.254***	0.052	0.211	83.466***	40.244**
			[0.065]				[0.069]	[0.043]				[0.066]	[0.106]				[0.070]	[0.043]	[0.098]			
		Colombia	0.218**	0.011	253.088***	48.312***	0.491***	0.600***	0.536	34.564***	31.680	0.215**	-0.040	0.009	251.665***	47.857***	0.512***	0.611***	0.234**	0.543	47.682***	32.370
			[0.091]				[0.075]	[0.038]				[0.094]	[0.125]				[0.075]	[0.038]	[0.099]			
		Peru	0.338***	0.029	154.822***	36.678*	0.486***	0.360***	0.187	51.072***	41.299**	0.353***	0.285***	0.042	147.534***	31.775	0.510***	0.372***	0.364***	0.211	38.605***	35.777*
			[0.090]				[0.094]	[0.064]				[0.089]	[0.105]				[0.091]	[0.061]	[0.126]			

Appendix C.4

Impact of Value-Weighted [Cumulative] Industry (39 FTSE Industry Sectors) and Country Factors in Variance of Residuals from ICAPM Model, An EGARCH (1, 1) Model without Leverage Effect, All Sample [Stock] Markets (January 1994 – June 2003)

This table reports the estimated coefficients for each factor, i.e., a world market factor (FTSE), a country factor (CNT) and a value-weighted [cumulative] industry factor (IND), from the EGARCH regression model for each country. Standard errors are reported for each coefficient in square brackets, along with some model specification diagnostics. The mean equation is specified as an ICAPM model: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t}$; and, the conditional variance equations are specified as three augmented EGARCH(1,1) processes without leverage effect. They are: Model I: $\text{EGARCH}(1,1) + [\text{Country Factor}]_{k,t}$; Model II: $\text{EGARCH}(1,1) + [\text{Industry Factor}]_{k,t}$; and, Model III: $\text{EGARCH}(1,1) + [\text{Country Factor}]_{k,t} + [\text{Industry Factor}]_{k,t}$, with the assumption that the residuals from the mean equation follow a normal distribution. An EGARCH (1, 1) without the leverage effect is used as the reference model and is reported under column "Benchmark: ICAPM + EGARCH." r_k (r_{FTSE}) is the weekly excess return of country k (a world market portfolio) above a one-week Eurodollar deposit rate; country and value-weighted cumulative industry factors are estimated from a dummy variable regression model of Heston and Rouwenhorst (1994) via industry returns on all available FTSE Industry Sector indices in all sample markets (33). Cap-weights are computed by using market capitalization at the beginning of the synthetic week (Wednesday-to-Wednesday) for each available Industry Sector index within each market. Both adjusted R^2s and Schwartz Bayesian Information Criterion (BIC) is also provided along with each model to compare the effectiveness of four model specifications. Significance at the 1% level is denoted by ***, at the 5% level by **, and at the 10% level by *.

Group	Sub-group	Country	Benchmark: ICAPM + EGARCH			Model I: Country Factor				Model II: Industry Factor				Model III: Country Factor + Industry Factor				
			FTSE	Adj. R-sq	BIC	FTSE	CNT	Adj. R-sq	BIC	FTSE	IND	Adj. R-sq	BIC	FTSE	CNT	IND	Adj. R-sq	BIC
DSM	G7	Canada	0.883***	0.579	-2666.5	0.882***	1.000	0.578	-2660.9	0.883***	-6.008**	0.579	-2663.8	0.875***	>0.000	-5.009*	0.577	-2658.6
			[0.031]			[0.031]	[1.107]			[0.031]	[3.218]			[0.032]	[1.029]	[3.263]		
		United States	1.059***	0.857	-3208.5	1.061***	-1.000	0.857	-3202.4	1.066***	22.892*	0.857	-3204.6	1.064***	1.000	20.000	0.856	-3198.5
			[0.018]			[0.018]	[3.548]			[0.017]	[17.333]			[0.018]	[3.420]	[17.421]		
		France	1.036***	0.603	-2520.6	1.040***	-6.248***	0.601	-2526.1	1.031***	10.749*	0.602	-2516.8	1.035***	-6.369***	11.000	0.599	-2521.7
			[0.030]			[0.029]	[1.588]			[0.031]	[7.810]			[0.030]	[1.632]	[10.802]		
		Germany	1.157***	0.633	-2505.8	1.159***	-2.904**	0.631	-2502.5	1.158***	12.422**	0.632	-2503.9	1.160***	-3.696***	15.202***	0.630	-2501.8
			[0.032]			[0.033]	[1.362]			[0.032]	[5.776]			[0.033]	[1.405]	[6.161]		
		United Kingdom	0.816***	0.613	-2774.6	0.811***	-1.619*	0.612	-2770.2	0.813***	-3.000	0.612	-2768.7	0.810***	-1.618*	-2.000	0.611	-2764.2
			[0.027]			[0.029]	[0.988]			[0.027]	[3.437]			[0.029]	[1.012]	[3.414]		
		Italy	1.019***	0.379	-2154.0	1.003***	>0.000	0.378	-2150.8	1.019***	-1.000	0.378	-2148.5	1.007***	>0.000	-1.000	0.377	-2146.5
			[0.054]			[0.051]	[0.618]			[0.055]	[2.338]			[0.051]	[0.608]	[1.667]		
		Japan	0.722***	0.253	-2187.0	0.727***	5.279***	0.246	-2192.6	0.732***	2.000	0.252	-2181.8	0.714***	6.458***	18.102**	0.237	-2191.6
			[0.044]			[0.035]	[0.976]			[0.045]	[2.725]			[0.038]	[1.021]	[7.862]		
	Asia/ Australasia	Australia	0.620***	0.322	-2472.5	0.624***	-0.551*	0.321	-2467.4	0.623***	-2.000	0.321	-2466.1	0.620***	-0.706**	1.000	0.319	-2460.4
			[0.037]			[0.038]	[0.358]			[0.037]	[2.103]			[0.038]	[0.382]	[2.431]		
		New Zealand	0.529***	0.152	-2184.6	0.530***	-1.220***	0.149	-2180.4	0.529***	<0.000	0.150	-2178.4	0.529***	-1.224***	>0.000	0.148	-2174.3
			[0.047]			[0.040]	[0.389]			[0.047]	[1.559]			[0.040]	[0.390]	[1.294]		
		Hong Kong/China	0.853***	0.259	-2018.8	0.803***	-2.533***	0.254	-2028.6	0.853***	>0.000	0.258	-2012.7	0.808***	-2.461***	-1.000	0.253	-2022.5
			[0.056]			[0.054]	[0.533]			[0.056]	[1.127]			[0.054]	[0.532]	[1.296]		
		Singapore	0.669***	0.167	-1962.2	0.655***	-1.451***	0.164	-1963.5	0.674***	-2.000	0.166	-1956.2	0.665***	-1.482***	-1.000	0.162	-1957.3
			[0.054]			[0.054]	[0.454]			[0.055]	[2.037]			[0.055]	[0.472]	[1.952]		

(Appendix C.4 - *Continued*)

Group	Sub-group	Country	Benchmark: ICAPM + EGARCH			Model I: Country Factor				Model II: Industry Factor				Model III: Country Factor + Industry Factor				
			FTSE	Adj. R-sq	BIC	FTSE	CNT	Adj. R-sq	BIC	FTSE	IND	Adj. R-sq	BIC	FTSE	CNT	IND	Adj. R-sq	BIC
ESM	Advanced	Brazil	0.946***	0.174	-1416.7	1.156***	-2.553***	0.182	-1474.2	1.013***	7.328***	0.177	-1418.7	1.154***	-2.517***	3.000	0.179	-1469.1
			[0.046]			[0.075]	[0.281]			[0.059]	[2.592]			[0.079]	[0.294]	[2.487]		
		Mexico	1.141***	0.237	-1731.2	1.102***	-2.543***	0.229	-1759.0	1.133***	-1.000	0.234	-1725.0	1.100***	-2.619***	-2.000	0.227	-1754.0
			[0.065]			[0.068]	[0.303]			[0.066]	[2.070]			[0.067]	[0.309]	[1.893]		
		Israel	0.625***	0.144	-1959.3	0.644***	-5.291***	0.120	-1977.1	0.625***	1.000	0.142	-1953.1	0.645***	-5.554***	-1.000	0.115	-1971.0
			[0.060]			[0.064]	[0.914]			[0.060]	[2.503]			[0.066]	[0.922]	[3.250]		
		Korea	1.060***	0.171	-1552.9	1.054***	-0.446***	0.169	-1550.0	1.045***	-2.000	0.168	-1547.7	1.045***	-0.405**	-1.000	0.167	-1543.9
			[0.084]			[0.090]	[0.176]			[0.089]	[2.219]			[0.092]	[0.204]	[2.441]		
		Taiwan/China	0.696***	0.120	-1753.6	0.682***	-0.752*	0.117	-1748.9	0.662***	-4.756**	0.117	-1752.6	0.663***	-0.774*	-4.674**	0.114	-1747.5
			[0.077]			[0.079]	[0.520]			[0.081]	[2.244]			[0.084]	[0.525]	[2.209]		
		South Africa	0.692***	0.173	-1985.7	0.676***	-3.593***	0.166	-2008.5	0.693***	<0.000	0.171	-1979.5	0.675***	-3.549***	>0.000	0.165	-2002.4
			[0.058]			[0.056]	[0.503]			[0.059]	[1.174]			[0.056]	[0.530]	[1.656]		
	Asia	India	0.198***	0.013	-1828.4	0.211***	-0.830*	0.011	-1824.7	0.210***	<0.000	0.012	-1822.0	0.214***	-0.872*	-2.000	0.010	-1819.4
			[0.069]			[0.067]	[0.555]			[0.070]	[3.331]			[0.067]	[0.558]	[2.666]		
		Pakistan	0.191**	-0.008	-1507.2	0.188**	-0.739**	-0.009	-1502.5	0.174**	-7.219***	-0.009	-1507.8	0.175**	-1.288***	-8.584***	-0.012	-1505.9
			[0.100]			[0.102]	[0.357]			[0.104]	[2.196]			[0.100]	[0.387]	[2.316]		
		China	0.262***	0.003	-1645.3	0.263***	>0.000	0.001	-1639.3	0.240***	-7.318***	0.001	-1645.8	0.239***	>0.000	-7.179***	-0.001	-1640.0
			[0.080]			[0.080]	[0.397]			[0.079]	[2.291]			[0.079]	[0.415]	[2.282]		
		Indonesia	0.264***	0.002	-900.9	0.308***	-0.562***	0.000	-900.6	0.179***	-2.313*	-0.003	-896.5	0.235***	-0.754***	-3.942***	-0.005	-899.3
			[0.066]			[0.071]	[0.151]			[0.068]	[1.474]			[0.074]	[0.156]	[1.653]		
		Malaysia	0.344***	0.028	-1784.8	0.329***	-2.176***	0.024	-1796.4	0.335***	2.794**	0.026	-1781.3	0.332***	-2.229***	<0.000	0.022	-1790.2
			[0.060]			[0.054]	[0.352]			[0.060]	[1.572]			[0.054]	[0.365]	[1.337]		
		Philippines	0.435***	0.044	-1178.6	0.468***	-0.902***	0.041	-1176.4	0.456***	3.571**	0.042	-1175.8	0.467***	-0.776***	2.811*	0.040	-1173.1
			[0.076]			[0.079]	[0.305]			[0.084]	[1.936]			[0.086]	[0.320]	[1.783]		
		Thailand	0.624***	0.070	-1274.8	0.631***	-0.749***	0.068	-1274.6	0.625***	>0.000	0.068	-1268.7	0.624***	-0.910***	-2.000	0.064	-1269.2
			[0.094]			[0.089]	[0.257]			[0.094]	[1.477]			[0.087]	[0.338]	[1.782]		
	Europe	Czech Republic	0.568***	0.098	-1302.5	0.566***	<0.000	0.096	-1297.0	0.567***	-1.000	0.096	-1297.0	0.564***	-1.000	-2.000	0.093	-1291.1
			[0.079]			[0.083]	[1.106]			[0.081]	[3.328]			[0.085]	[1.033]	[4.111]		
		Hungary	0.793***	0.219	-1065.5	0.792***	-1.000	0.216	-1060.8	0.802***	-9.548**	0.216	-1063.7	0.815***	-1.000	-10.536**	0.211	-1059.6
			[0.073]			[0.073]	[0.748]			[0.071]	[4.892]			[0.071]	[0.909]	[5.354]		
		Poland	0.761***	0.102	-1631.6	0.761***	<0.000	0.100	-1625.5	0.748***	-3.905**	0.099	-1630.1	0.747***	<0.000	-3.801**	0.098	-1623.9
			[0.074]			[0.074]	[0.303]			[0.071]	[1.760]			[0.072]	[0.321]	[1.767]		
		Turkey	0.872***	0.056	-1086.3	0.809***	-0.690***	0.051	-1084.5	0.870***	2.948*	0.054	-1082.1	0.815***	-0.607**	2.000	0.049	-1078.9
			[0.134]			[0.139]	[0.268]			[0.139]	[2.097]			[0.142]	[0.263]	[2.248]		
		Russia	0.783***	0.077	-696.7	0.786***	-0.731***	0.071	-708.7	0.814***	-3.454***	0.079	-696.8	0.798***	-0.936***	-5.228***	0.070	-716.5
			[0.115]			[0.117]	[0.110]			[0.119]	[1.388]			[0.078]	[0.174]	[0.563]		
	Lat. America	Argentina	0.907***	0.105	-1561.9	0.929***	-1.996***	0.100	-1569.8	0.901***	-1.000	0.103	-1556.1	0.919***	-2.073***	-2.111*	0.098	-1565.0
			[0.073]			[0.083]	[0.363]			[0.075]	[1.888]			[0.081]	[0.373]	[1.501]		
		Chile	0.518***	0.126	-2025.6	0.522***	-0.976*	0.124	-2021.5	0.522***	>0.000	0.124	-2020.3	0.513***	-1.043**	1.000	0.122	-2015.8
			[0.053]			[0.053]	[0.612]			[0.051]	[1.316]			[0.051]	[0.616]	[1.372]		
		Colombia	0.151**	0.003	-1771.5	0.185***	3.139***	-0.002	-1787.7	0.141**	-8.798***	0.001	-1770.4	0.182***	3.107***	-1.000	-0.004	-1781.6
			[0.074]			[0.063]	[0.367]			[0.075]	[2.601]			[0.064]	[0.447]	[3.548]		
		Peru	0.165**	0.014	-1805.1	0.166***	-1.000	0.012	-1799.6	0.168**	1.000	0.013	-1799.9	0.168***	<0.000	1.000	0.010	-1794.2
			[0.073]			[0.070]	[0.472]			[0.074]	[1.597]			[0.072]	[0.470]	[1.639]		

Appendix C.5

Impact of Value-Weighted [Cumulative] Industry (39 FTSE Industry Sectors) and Country Factors in Variance of Residuals from ICAPM Model, An EGARCH(1,1) Model without Leverage Effect, Sub-samples of Developed and Emerging [Stock] Markets (January 1994 – June 2003)

This table reports the estimated coefficients for each factor, i.e., a world market factor (FTSE), a country factor (CNT) and a value-weighted [cumulative] industry factor (IND), from the EGARCH regression model for each country. Standard errors are reported for each coefficient in square brackets, along with some model specification diagnostics. The mean equation is specified as an ICAPM model: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t}$; and, the conditional variance equations are specified as three augmented EGARCH(1,1) processes without leverage effect. They are: Model I: EGARCH(1,1) + [Country Factor]$_{k,t}$; Model II: EGARCH(1,1) + [Industry Factor]$_{k,t}$; and, Model III: EGARCH(1,1) + [Country Factor]$_{k,t}$ + [Industry Factor]$_{k,t}$, with the assumption that the residuals from the mean equation follow a normal distribution. An EGARCH(1,1) without the leverage effect is used as the reference model and is reported under column "Benchmark: ICAPM + EGARCH." r_k (r_{FTSE}) is the weekly excess return of country k (a world market portfolio) above a one-week Eurodollar deposit rate; country and value-weighted cumulative industry factors are estimated from a dummy variable regression model of Heston and Rouwenhorst (1994) via industry returns on all available FTSE Industry Sector indices in two sub-samples of markets. Panel A reports the regression results for a sub-sample of developed markets (11); and, Panel B for a sub-sample of emerging markets (22). Cap-weights are computed by using market capitalization at the beginning of the synthetic week (Wednesday-to-Wednesday) for each available Industry Sector index within each market. Both adjusted R^2s and Schwartz Bayesian Information Criterion (BIC) is also provided along with each model to compare the effectiveness of four model specifications. Significance at the 1% level is denoted by ***, at the 5% level by **, and at the 10% level by *.

Panel A: Developed Markets Only

Group	Sub-group	Country	Benchmark: ICAPM + EGARCH			Model I: Country Factor				Model II: Industry Factor				Model III: Country Factor + Industry Factor				
			FTSE	Adj. R-sq	BIC	FTSE	CNT	Adj. R-sq	BIC	FTSE	IND	Adj. R-sq	BIC	FTSE	CNT	IND	Adj. R-sq	BIC
		Canada	0.883***	0.579	-2666.5	0.884***	-2.009**	0.578	-2663.1	0.888***	-9.855***	0.579	-2667.3	0.887***	-1.000	-9.117***	0.578	-2661.5
			[0.031]			[0.033]	[1.146]			[0.032]	[3.601]			[0.032]	[1.264]	[3.847]		
		United States	1.059***	0.857	-3208.5	1.059***	-3.243*	0.857	-3209.8	1.061***	17.000	0.857	-3203.3	1.061***	-3.000	21.000	0.856	-3197.5
			[0.018]			[0.017]	[2.462]			[0.018]	[13.906]			[0.018]	[2.893]	[17.387]		
		France	1.036***	0.603	-2520.6	1.029***	-5.810***	0.600	-2526.0	1.035***	-1.000	0.602	-2514.5	1.027***	-5.814***	-5.000	0.600	-2520.2
			[0.030]			[0.029]	[1.220]			[0.030]	[6.367]			[0.030]	[1.204]	[6.609]		
DSM	*G7*	Germany	1.157***	0.633	-2505.8	1.148***	-3.508**	0.631	-2503.9	1.157***	-4.000	0.632	-2499.9	1.148***	-3.559**	-1.000	0.630	-2497.8
			[0.032]			[0.033]	[1.560]			[0.033]	[4.106]			[0.033]	[1.602]	[4.057]		
		United Kingdom	0.816***	0.613	-2774.6	0.811***	-1.661**	0.612	-2771.3	0.822***	-5.000	0.613	-2769.7	0.811***	-1.456*	-5.000	0.611	-2766.2
			[0.027]			[0.029]	[0.943]			[0.027]	[4.352]			[0.028]	[0.905]	[3.879]		
		Italy	1.019***	0.379	-2154.0	0.999***	1.423**	0.378	-2154.6	1.020***	>0.000	0.378	-2147.8	0.996***	1.476**	-1.000	0.376	-2149.1
			[0.054]			[0.051]	[0.686]			[0.055]	[2.706]			[0.051]	[0.680]	[1.931]		
		Japan	0.722***	0.253	-2187.0	0.731***	5.014***	0.247	-2192.6	0.740***	-12.037***	0.252	-2186.5	0.740***	4.487***	-13.437***	0.247	-2191.0
			[0.044]			[0.036]	[0.995]			[0.044]	[4.780]			[0.039]	[0.989]	[5.653]		
		Australia	0.620***	0.322	-2472.5	0.624***	-1.000	0.321	-2467.3	0.620***	<0.000	0.321	-2466.3	0.620***	-0.673*	3.000	0.319	-2461.8
			[0.037]			[0.038]	[0.506]			[0.037]	[2.858]			[0.039]	[0.524]	[3.509]		
		New Zealand	0.529***	0.152	-2184.6	0.537***	-1.281***	0.149	-2182.2	0.529***	<0.000	0.150	-2178.4	0.542***	-1.418***	-1.000	0.148	-2174.7
			[0.047]			[0.038]	[0.414]			[0.047]	[1.552]			[0.039]	[0.501]	[1.385]		
	Asia/ Australasia	Hong Kong/China	0.853***	0.259	-2018.8	0.783***	-3.218***	0.251	-2038.8	0.853***	<0.000	0.258	-2012.7	0.786***	-3.173***	<0.000	0.250	-2032.7
			[0.056]			[0.051]	[0.556]			[0.056]	[0.965]			[0.051]	[0.549]	[1.055]		
		Singapore	0.669***	0.167	-1962.2	0.669***	-1.742***	0.164	-1965.7	0.668***	<0.000	0.165	-1956.0	0.671***	-1.737***	<0.000	0.162	-1959.5
			[0.054]			[0.054]	[0.448]			[0.055]	[1.894]			[0.054]	[0.452]	[1.786]		

Panel B: Emerging Markets Only

Group	Sub-group	Country	Benchmark: ICAPM + EGARCH			Model I: Country Factor				Model II: Industry Factor				Model III: Country Factor + Industry Factor				
			FTSE	Adj. R-sq	BIC	FTSE	CNT	Adj. R-sq	BIC	FTSE	IND	Adj. R-sq	BIC	FTSE	CNT	IND	Adj. R-sq	BIC
ESM	Advanced	Brazil	0.946***	0.174	-1416.7	1.194***	-2.844***	0.184	-1459.9	1.032***	8.015***	0.178	-1415.7	1.178***	-2.779***	>0.000	0.181	-1453.8
			[0.046]			[0.072]	[0.378]			[0.080]	[3.068]			[0.082]	[0.381]	[3.104]		
		Mexico	1.141***	0.237	-1731.2	1.131***	-2.568***	0.233	-1747.4	1.126***	-2.000	0.235	-1725.5	1.130***	-2.552***	-1.000	0.231	-1741.2
			[0.065]			[0.067]	[0.359]			[0.066]	[2.324]			[0.069]	[0.377]	[2.223]		
		Israel	0.625***	0.144	-1959.3	0.660***	-3.594***	0.135	-1966.5	0.624***	1.000	0.142	-1953.4	0.662***	-3.601***	2.000	0.133	-1960.9
			[0.060]			[0.062]	[0.792]			[0.060]	[1.923]			[0.063]	[0.788]	[2.319]		
		Korea	1.060***	0.171	-1552.9	1.051***	-0.358*	0.169	-1548.6	1.039***	-1.000	0.168	-1547.4	1.039***	<0.000	-1.000	0.166	-1542.6
			[0.084]			[0.089]	[0.231]			[0.088]	[1.437]			[0.090]	[0.276]	[1.679]		
		Taiwan/China	0.696***	0.120	-1753.6	0.691***	>0.000	0.118	-1747.5	0.668***	-2.617*	0.117	-1749.6	0.676***	<0.000	-2.700*	0.116	-1743.4
			[0.077]			[0.077]	[0.559]			[0.080]	[1.804]			[0.080]	[0.542]	[1.699]		
		South Africa	0.692***	0.173	-1985.7	0.694***	-1.881***	0.171	-1985.7	0.691***	>0.000	0.171	-1979.5	0.690***	-1.855***	1.000	0.169	-1979.6
			[0.058]			[0.056]	[0.546]			[0.059]	[1.481]			[0.056]	[0.543]	[1.681]		
	Asia	India	0.198***	0.013	-1828.4	0.204***	1.277**	0.011	-1823.0	0.218***	1.000	0.012	-1822.5	0.209***	1.426**	2.000	0.009	-1817.2
			[0.069]			[0.068]	[0.694]			[0.069]	[2.206]			[0.068]	[0.716]	[2.850]		
		Pakistan	0.191**	-0.008	-1507.2	0.186**	-0.517*	-0.009	-1501.6	0.162*	-5.773***	-0.009	-1504.6	0.181**	-0.910**	-6.617***	-0.011	-1500.3
			[0.100]			[0.101]	[0.387]			[0.102]	[2.106]			[0.100]	[0.416]	[2.278]		
		China	0.262***	0.003	-1645.3	0.268***	0.661**	0.001	-1640.8	0.245***	-3.000	0.001	-1639.9	0.242***	0.614**	-2.000	-0.001	-1635.2
			[0.080]			[0.080]	[0.359]			[0.080]	[2.178]			[0.082]	[0.365]	[2.176]		
		Indonesia	0.264***	0.002	-900.9	0.302***	-0.547***	0.001	-899.4	0.198***	-2.505**	-0.002	-897.3	0.242***	-0.605***	-2.763**	-0.005	-896.2
			[0.066]			[0.070]	[0.169]			[0.076]	[1.510]			[0.079]	[0.176]	[1.477]		
		Malaysia	0.344***	0.028	-1784.8	0.335***	-0.963***	0.025	-1781.5	0.340***	>0.000	0.026	-1778.6	0.336***	-1.094***	1.000	0.023	-1776.0
			[0.060]			[0.056]	[0.362]			[0.060]	[2.034]			[0.056]	[0.384]	[1.928]		
		Philippines	0.435***	0.044	-1178.6	0.446***	-0.798**	0.041	-1174.8	0.440***	2.000	0.041	-1173.7	0.457***	-0.755**	2.000	0.039	-1169.7
			[0.076]			[0.078]	[0.365]			[0.081]	[2.050]			[0.080]	[0.381]	[1.968]		
		Thailand	0.624***	0.070	-1274.8	0.628***	-0.739***	0.067	-1273.5	0.626***	1.000	0.068	-1268.9	0.627***	-0.731***	>0.000	0.065	-1267.4
			[0.094]			[0.087]	[0.288]			[0.095]	[1.828]			[0.088]	[0.301]	[1.896]		
	Europe	Czech Republic	0.568***	0.098	-1302.5	0.565***	1.000	0.096	-1297.3	0.546***	-1.000	0.095	-1296.3	0.570***	1.000	13.855**	0.092	-1297.3
			[0.079]			[0.081]	[0.945]			[0.081]	[5.570]			[0.083]	[1.161]	[6.900]		
		Hungary	0.793***	0.219	-1065.5	0.790***	<0.000	0.217	-1059.9	0.796***	-8.312**	0.216	-1063.8	0.801***	<0.000	-8.751**	0.213	-1058.4
			[0.073]			[0.073]	[0.716]			[0.072]	[4.359]			[0.072]	[0.888]	[4.434]		
		Poland	0.761***	0.102	-1631.6	0.760***	>0.000	0.100	-1625.5	0.748***	-3.880***	0.099	-1629.6	0.747***	>0.000	-3.751**	0.098	-1623.5
			[0.074]			[0.074]	[0.345]			[0.074]	[1.638]			[0.074]	[0.363]	[1.678]		
		Turkey	0.872***	0.056	-1086.3	0.820***	-0.849***	0.051	-1085.3	0.870***	6.534***	0.054	-1088.5	0.870***	-0.695***	5.353***	0.051	-1086.2
			[0.134]			[0.137]	[0.302]			[0.140]	[2.146]			[0.141]	[0.245]	[2.236]		
		Russia	0.783***	0.077	-696.7	0.798***	-1.008***	0.074	-703.5	0.790***	-4.135***	0.077	-701.1	0.746***	-0.691***	-3.879***	0.067	-716.7
			[0.115]			[0.116]	[0.147]			[0.114]	[1.235]			[0.093]	[0.208]	[0.773]		
	Lat. America	Argentina	0.907***	0.105	-1561.9	0.944***	-1.825***	0.100	-1563.3	0.902***	-2.677*	0.103	-1557.0	0.932***	-1.984***	-3.006**	0.098	-1559.5
			[0.073]			[0.081]	[0.457]			[0.071]	[1.909]			[0.079]	[0.471]	[1.558]		
		Chile	0.518***	0.126	-2025.6	0.510***	1.657**	0.123	-2025.2	0.520***	1.000	0.124	-2020.2	0.508***	1.619***	>0.000	0.122	-2020.1
			[0.053]			[0.052]	[0.760]			[0.052]	[1.783]			[0.049]	[0.684]	[1.725]		
		Colombia	0.151**	0.003	-1771.5	0.194***	3.562***	-0.002	-1789.1	0.149**	-5.414*	0.001	-1767.1	0.196***	3.542***	<0.000	-0.004	-1782.9
			[0.074]			[0.067]	[0.390]			[0.073]	[3.821]			[0.067]	[0.424]	[3.745]		
		Peru	0.165**	0.014	-1805.1	0.165**	<0.000	0.012	-1799.2	0.162**	1.000	0.012	-1799.8	0.164**	<0.000	1.000	0.010	-1793.7
			[0.073]			[0.072]	[0.523]			[0.075]	[1.264]			[0.074]	[0.531]	[1.312]		

Appendix C.6

Impact of Value-Weighted [Cumulative] Industry (39 FTSE Industry Sectors) and Country Factors in Variance of Residuals from ICAPM Model, An EGARCH (1, 1) Model with Leverage Effect, All Sample [Stock] Markets (January 1994 – June 2003)

This table reports the estimated coefficients for each factor, i.e., a world market factor (FTSE), a country factor (CNT) and a value-weighted [cumulative] industry factor (IND), from the EGARCH regression model for each country. Standard errors are reported for each coefficient in square brackets, along with some model specification diagnostics. The mean equation is specified as an ICAPM model: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t}$; and, variance equations are specified as three augmented EGARCH(1,1) processes without leverage effect. They are: Model I: EGARCH(1,1) + LEV + $[\text{Country Factor}]_{k,t}$; Model II: EGARCH(1,1) + LEV + $[\text{Industry Factor}]_{k,t}$; and, Model III: EGARCH(1,1) + LEV + $[\text{Country Factor}]_{k,t} + [\text{Industry Factor}]_{k,t}$, with the assumption that the residuals from the mean equation follow a normal distribution. An EGARCH (1, 1) with the leverage effect is used as the reference model and is reported under column "Benchmark: ICAPM + EGARCH + LEV." r_k (r_{FTSE}) is the weekly excess return of country k (a world market portfolio) above a one-week Eurodollar deposit rate; country and value-weighted cumulative industry factors are estimated from a dummy variable regression model of Heston and Rouwenhorst (1994) via industry returns on all available FTSE Industry Sector indices in all sample markets (33). Cap-weights are computed by using market capitalization at the beginning of the synthetic week (Wednesday-to-Wednesday) for each available Industry Sector index within each market. Both adjusted R^2s and Schwartz Bayesian Information Criterion (BIC) is also provided along with each model to compare the effectiveness of four model specifications. Significance at the 1% level is denoted by ***, at the 5% level by **, and at the 10% level by *.

Group	Sub-group	Country	Benchmark: ICAPM + EGARCH +LEV				Model I: Country Factor					Model II: Industry Factor					Model III: Country Factor + Industry Factor					
			FTSE	LEV	Adj. R-sq	BIC	FTSE	LEV	CNT	Adj. R-sq	BIC	FTSE	LEV	IND	Adj. R-sq	BIC	FTSE	LEV	CNT	IND	Adj. R-sq	BIC
DSM	G7	Canada	0.880***	<0.000	0.578	-2661.1	0.877***	<0.000	1.000	0.577	-2656.0	0.876***	<0.000	-5.615*	0.577	-2657.8	0.875***	<0.000	1.000	-4.818*	0.576	-2652.4
			[0.032]	[0.128]			[0.032]	[0.129]	[1.120]			[0.033]	[0.153]	[3.455]			[0.030]	[0.141]	[1.045]	[3.077]		
		United States	1.056***	0.884*	0.857	-3214.0	1.052***	1.000	-6.931**	0.856	-3209.3	1.056***	0.770**	-11.000	0.856	-3208.9	1.053***	1.000	-8.227**	2.000	0.855	-3202.8
			[0.017]	[0.645]			[0.018]	[0.827]	[4.197]			[0.017]	[0.434]	[9.459]			[0.019]	[0.866]	[4.341]	[18.704]		
		France	1.039***	-0.487*	0.602	-2516.8	1.045***	-0.694**	-7.289***	0.601	-2524.6	1.030***	-0.446*	10.000	0.601	-2511.9	1.039***	-0.601**	-7.313***	7.000	0.600	-2519.1
			[0.032]	[0.316]			[0.032]	[0.330]	[1.662]			[0.033]	[0.296]	[9.244]			[0.032]	[0.301]	[1.789]	[11.547]		
		Germany	1.159***	<0.000	0.633	-2500.5	1.161***	<0.000	-2.724**	0.631	-2496.7	1.159***	<0.000	11.909**	0.632	-2497.9	1.165***	<0.000	-3.617***	15.169***	0.630	-2495.7
			[0.032]	[0.121]			[0.033]	[0.130]	[1.358]			[0.032]	[0.119]	[5.963]			[0.033]	[0.129]	[1.416]	[6.462]		
		United Kingdom	0.808***	-0.952**	0.611	-2777.1	0.805***	-0.923**	-1.000	0.611	-2771.4	0.800***	-0.896**	-4.000	0.610	-2771.2	0.799***	-0.869**	-1.000	-4.000	0.609	-2765.6
			[0.028]	[0.550]			[0.029]	[0.548]	[1.060]			[0.027]	[0.520]	[4.307]			[0.028]	[0.514]	[1.082]	[4.275]		
		Italy	1.034***	0.407*	0.377	-2154.7	1.039***	0.599**	-1.031*	0.375	-2148.4	0.993***	0.622*	-1.000	0.376	-2155.1	0.991***	1.000	<0.000	-1.000	0.375	-2149.5
			[0.054]	[0.258]			[0.053]	[0.313]	[0.753]			[0.047]	[0.381]	[1.195]			[0.047]	[0.493]	[0.526]	[1.128]		
		Japan	0.678***	-0.514***	0.250	-2191.5	0.697***	-0.765***	5.661***	0.239	-2200.7	0.679***	-0.477***	2.000	0.249	-2185.3	0.701***	-0.746***	5.476***	1.000	0.239	-2194.7
			[0.039]	[0.121]			[0.033]	[0.226]	[0.988]			[0.041]	[0.126]	[2.926]			[0.036]	[0.223]	[1.027]	[4.915]		
	Asia/ Australasia	Australia	0.615***	-1.000	0.321	-2471.7	0.614***	-1.000	<0.000	0.319	-2465.6	0.614***	-1.000	1.000	0.319	-2464.4	0.613***	-1.000	<0.000	1.000	0.318	-2458.1
			[0.039]	[1.621]			[0.039]	[1.931]	[0.548]			[0.039]	[1.856]	[2.488]			[0.039]	[2.212]	[0.549]	[2.430]		
		New Zealand	0.528***	<0.000	0.150	-2183.6	0.528***	<0.000	<0.000	0.148	-2178.1	0.529***	<0.000	-1.000	0.148	-2176.9	0.503***	-1.000	-1.000	1.000	0.146	-2171.6
			[0.043]	[0.372]			[0.042]	[0.416]	[0.558]			[0.043]	[0.388]	[1.573]			[0.041]	[0.779]	[0.523]	[1.444]		
		Hong Kong/China	0.829***	-0.391***	0.257	-2019.3	0.801***	<0.000	-2.162***	0.253	-2023.6	0.824***	-0.390***	<0.000	0.256	-2013.1	0.803***	<0.000	-2.189***	-1.000	0.251	-2017.5
			[0.057]	[0.163]			[0.054]	[0.155]	[0.585]			[0.057]	[0.163]	[1.152]			[0.054]	[0.164]	[0.589]	[1.282]		
		Singapore	0.644***	-0.467**	0.164	-1964.9	0.652***	<0.000	-1.000	0.163	-1959.3	0.648***	-0.479**	-2.000	0.162	-1959.2	0.654***	<0.000	-1.000	-2.000	0.161	-1953.4
			[0.054]	[0.210]			[0.054]	[0.214]	[0.627]			[0.054]	[0.213]	[1.711]			[0.054]	[0.212]	[0.646]	[1.860]		

(Appendix C.6 - *Continued*)

Group	Sub-group	Country	Benchmark: ICAPM + EGARCH +LEV				Model I: Country Factor					Model II: Industry Factor					Model III: Country Factor + Industry Factor					
			FTSE	LEV	Adj. R-sq	BIC	FTSE	LEV	CNT	Adj. R-sq	BIC	FTSE	LEV	IND	Adj. R-sq	BIC	FTSE	LEV	CNT	IND	Adj. R-sq	BIC
ESM	Advanced	Brazil	1.004***	-0.917***	0.179	-1436.1	1.159***	-0.223*	-2.275***	0.181	-1470.0	1.031***	-0.764***	3.000	0.179	-1431.2	1.163***	<0.000	-2.280***	2.000	0.179	-1464.3
			[0.051]	[0.245]			[0.077]	[0.141]	[0.284]			[0.056]	[0.249]	[2.687]			[0.079]	[0.146]	[0.290]	[2.632]		
		Mexico	1.056***	-1.000***	0.235	-1755.3	1.068***	-0.707**	-1.626***	0.231	-1758.3	1.055***	-1.000***	-2.000	0.234	-1749.7	1.066***	-0.727**	-1.657***	-3.000	0.230	-1753.6
			[0.063]	[0.333]			[0.066]	[0.305]	[0.419]			[0.063]	[0.329]	[2.622]			[0.065]	[0.314]	[0.427]	[2.290]		
		Israel	0.622***	-0.476*	0.143	-1955.0	0.645***	>0.000	-5.494***	0.117	-1970.9	0.624***	-0.500*	>0.000	0.141	-1948.8	0.646***	>0.000	-5.549***	-1.000	0.115	-1964.8
			[0.061]	[0.305]			[0.065]	[0.354]	[0.914]			[0.061]	[0.320]	[3.111]			[0.066]	[0.370]	[0.921]	[3.214]		
		Korea	1.037***	-0.469***	0.166	-1557.3	1.028***	-0.433**	>0.000	0.164	-1550.9	1.022***	-0.432***	-1.000	0.164	-1551.1	1.027***	-0.454**	>0.000	-1.000	0.162	-1544.9
			[0.089]	[0.180]			[0.092]	[0.204]	[0.245]			[0.092]	[0.180]	[2.088]			[0.092]	[0.204]	[0.263]	[2.258]		
		Taiwan/China	0.672***	-0.307**	0.117	-1749.9	0.671***	<0.000	<0.000	0.116	-1744.0	0.658***	<0.000	-4.058*	0.115	-1746.8	0.649***	<0.000	-1.000	-4.240**	0.112	-1741.3
			[0.078]	[0.183]			[0.080]	[0.234]	[0.706]			[0.083]	[0.183]	[2.493]			[0.085]	[0.267]	[0.701]	[2.406]		
		South Africa	0.695***	-0.769***	0.171	-1989.9	0.676***	>0.000	-3.695***	0.164	-2002.4	0.690***	-0.789***	<0.000	0.169	-1983.8	0.675***	>0.000	-3.623***	>0.000	0.163	-1996.2
			[0.059]	[0.284]			[0.056]	[0.240]	[0.676]			[0.060]	[0.319]	[1.293]			[0.056]	[0.243]	[0.699]	[1.666]		
	Asia	India	0.214***	-0.443***	0.011	-1829.1	0.212***	-0.515***	1.000	0.008	-1823.1	0.214***	-0.474***	-1.000	0.009	-1823.4	0.220***	-0.498**	>0.000	-1.000	0.007	-1817.1
			[0.069]	[0.184]			[0.070]	[0.214]	[0.783]			[0.069]	[0.192]	[3.022]			[0.069]	[0.215]	[0.770]	[3.124]		
		Pakistan	0.187**	-0.170*	-0.010	-1502.4	0.182**	<0.000	<0.000	-0.011	-1496.7	0.167*	-0.157*	-7.230***	-0.011	-1503.4	0.163*	<0.000	-1.173**	-8.581***	-0.013	-1499.7
			[0.103]	[0.114]			[0.105]	[0.153]	[0.520]			[0.104]	[0.096]	[2.203]			[0.100]	[0.144]	[0.556]	[2.350]		
		China	0.259***	<0.000	0.001	-1639.6	0.264***	-0.115*	1.000	-0.001	-1634.4	0.243***	<0.000	-7.317***	-0.001	-1639.6	0.243***	<0.000	>0.000	-7.080***	-0.003	-1634.1
			[0.080]	[0.071]			[0.080]	[0.084]	[0.469]			[0.078]	[0.080]	[2.372]			[0.079]	[0.097]	[0.513]	[2.402]		
		Indonesia	0.294***	-0.245**	0.002	-898.2	0.308***	<0.000	-0.504**	-0.002	-894.7	0.216***	-0.433**	-5.046***	-0.002	-897.8	0.225***	<0.000	-0.503**	-4.827***	-0.007	-894.4
			[0.074]	[0.124]			[0.076]	[0.170]	[0.254]			[0.064]	[0.198]	[1.837]			[0.072]	[0.217]	[0.236]	[1.860]		
		Malaysia	0.312***	-0.727***	0.028	-1815.2	0.315***	-0.686***	<0.000	0.026	-1809.2	0.298***	-1.000***	-3.823***	0.025	-1810.2	0.301***	-1.000***	<0.000	-3.712***	0.023	-1805.9
			[0.061]	[0.148]			[0.060]	[0.155]	[0.362]			[0.060]	[0.342]	[1.304]			[0.061]	[0.342]	[0.350]	[1.335]		
		Philippines	0.438***	-0.332***	0.042	-1179.3	0.455***	-0.246**	-0.453*	0.039	-1173.9	0.430***	-0.390***	2.600**	0.038	-1176.9	0.436***	-0.334**	<0.000	2.554**	0.036	-1171.1
			[0.078]	[0.116]			[0.078]	[0.124]	[0.323]			[0.086]	[0.137]	[1.398]			[0.086]	[0.163]	[0.382]	[1.473]		
		Thailand	0.637***	-0.456**	0.071	-1277.0	0.635***	<0.000	<0.000	0.069	-1270.8	0.629***	-0.519**	-2.000	0.068	-1271.3	0.631***	<0.000	<0.000	-2.000	0.066	-1265.3
			[0.083]	[0.235]			[0.083]	[0.347]	[0.525]			[0.082]	[0.253]	[1.665]			[0.083]	[0.326]	[0.562]	[1.736]		
	Europe	Czech Republic	0.577***	-1.000	0.095	-1298.0	0.551***	-1.000	-1.000	0.093	-1292.2	0.585***	-1.000	-2.000	0.093	-1292.2	0.553***	-1.000	-1.000	-3.000	0.091	-1286.5
			[0.081]	[3.667]			[0.081]	[3.466]	[1.105]			[0.081]	[4.304]	[4.456]			[0.081]	[3.301]	[1.084]	[4.414]		
		Hungary	0.782***	-1.000	0.216	-1067.5	0.788***	-1.000*	1.629**	0.213	-1062.4	0.790***	-1.000	-8.294**	0.213	-1066.0	0.773***	-1.000	1.000	-7.442*	0.211	-1060.2
			[0.075]	[0.805]			[0.074]	[0.722]	[0.959]			[0.075]	[1.124]	[4.797]			[0.079]	[1.094]	[1.277]	[4.675]		
		Poland	0.762***	-0.444***	0.101	-1631.5	0.768***	-0.915***	1.190***	0.099	-1629.5	0.747***	-0.527**	-3.691**	0.098	-1629.6	0.743***	-1.000**	1.055**	-2.680**	0.096	-1627.0
			[0.073]	[0.171]			[0.068]	[0.347]	[0.451]			[0.068]	[0.242]	[1.675]			[0.067]	[0.442]	[0.459]	[1.560]		
		Turkey	0.849***	>0.000	0.053	-1080.3	0.790***	0.773**	-1.558***	0.036	-1086.1	0.861***	>0.000	3.309*	0.052	-1076.5	0.810***	0.804**	-1.568***	2.000	0.035	-1080.8
			[0.136]	[0.143]			[0.142]	[0.400]	[0.364]			[0.141]	[0.146]	[2.107]			[0.147]	[0.400]	[0.367]	[2.115]		
		Russia	0.827***	-1.000	0.079	-701.4	0.793***	-1.000	<0.000	0.074	-690.2	0.938***	-1.000	-2.266**	0.083	-693.2	0.889***	-1.000	-0.457*	-3.034***	0.076	-698.1
			[0.117]	[0.949]			[0.102]	[1.620]	[0.230]			[0.123]	[1.457]	[1.160]			[0.121]	[36.508]	[0.286]	[1.109]		
	Lat. America	Argentina	0.906***	-0.229***	0.103	-1558.6	0.918***	>0.000	-2.353***	0.095	-1564.4	0.890***	-0.202**	-2.000	0.102	-1553.2	0.921***	>0.000	-2.334***	-1.986*	0.093	-1559.4
			[0.081]	[0.084]			[0.085]	[0.150]	[0.443]			[0.078]	[0.086]	[1.857]			[0.083]	[0.146]	[0.442]	[1.531]		
		Chile	0.503***	-0.310***	0.123	-2025.2	0.504***	-0.302**	<0.000	0.122	-2018.9	0.507***	-0.343***	-1.000	0.122	-2019.3	0.507***	-0.358**	>0.000	-1.000	0.120	-2013.2
			[0.055]	[0.117]			[0.055]	[0.140]	[0.768]			[0.051]	[0.138]	[1.356]			[0.050]	[0.164]	[0.704]	[1.374]		
		Colombia	0.161**	-0.190**	0.002	-1767.3	0.191***	-0.383***	3.790***	-0.007	-1790.8	0.149**	-0.346***	-10.523***	-0.001	-1770.3	0.160**	-0.690***	3.213***	-6.980***	-0.007	-1783.9
			[0.076]	[0.098]			[0.066]	[0.119]	[0.431]			[0.075]	[0.103]	[2.130]			[0.075]	[0.157]	[0.494]	[2.359]		
		Peru	0.173***	-0.436**	0.014	-1805.8	0.172***	-0.509**	>0.000	0.012	-1799.9	0.175***	-0.441**	1.000	0.012	-1800.7	0.183***	-0.496**	>0.000	2.000	0.010	-1794.9
			[0.072]	[0.195]			[0.072]	[0.248]	[0.558]			[0.073]	[0.201]	[1.502]			[0.073]	[0.251]	[0.549]	[1.500]		

Appendix C.7

Impact of Value-Weighted [Cumulative] Industry (39 FTSE Industry Sectors) and Country Factors in Variance of Residuals from ICAPM Model, An EGARCH(1,1) Model with Leverage Effect, Sub-samples of Developed and Emerging [Stock] Markets (January 1994 – June 2003)

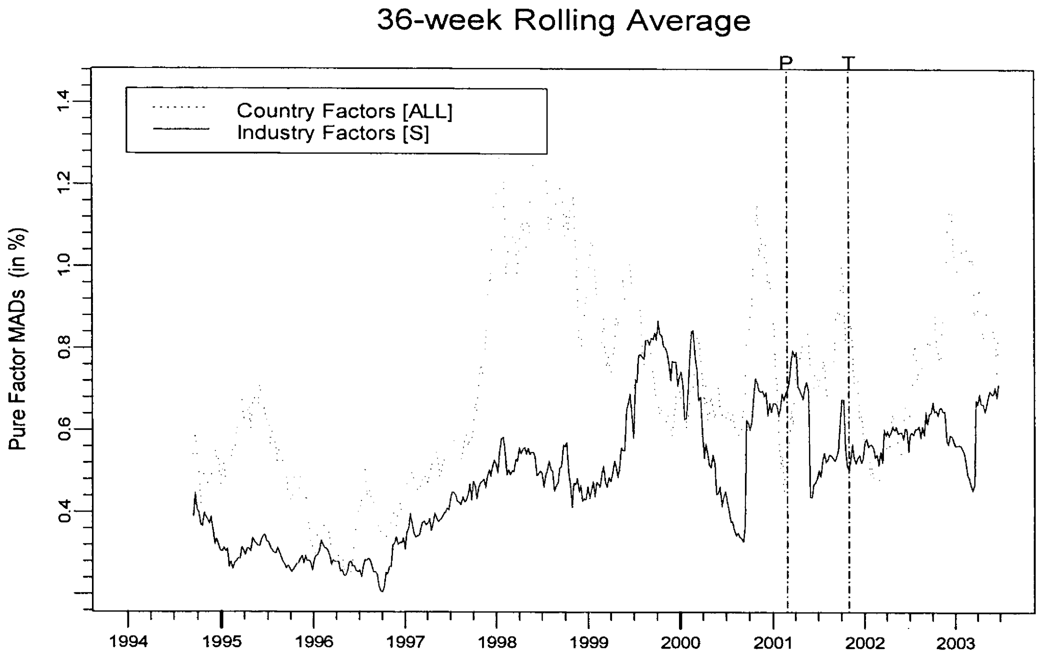
This table reports the estimated coefficients for each factor, i.e., a world market factor (FTSE), a country factor (CNT) and a value-weighted [cumulative] industry factor (IND), from the EGARCH regression model for each country. Standard errors are reported for each coefficient in square brackets, along with some model specification diagnostics. The mean equation is specified as an ICAPM model: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t}$; and, the conditional variance equations are specified as three augmented EGARCH(1,1) processes without the leverage effect. They are: Model I: EGARCH(1,1) + LEV +$[\text{Country Factor}]_{k,t}$; Model II: EGARCH(1,1) + LEV +$[\text{Industry Factor}]_{k,t}$; and, Model III: EGARCH(1,1) + LEV +$[\text{Country Factor}]_{k,t}$ +$[\text{Industry Factor}]_{k,t}$, with the assumption that the residuals from the mean equation follow a normal distribution. An EGARCH(1,1) with the leverage effect is used as the reference model and is reported under column "Benchmark: ICAPM + EGARCH + LEV." r_k (r_{FTSE}) is the weekly excess return of country k (a world market portfolio) above a one-week Eurodollar deposit rate; country and value-weighted cumulative industry factors are estimated from a dummy variable regression model of Heston and Rouwenhorst (1994) via the industry returns on all available FTSE Industry Sector indices in two sub-samples of markets. Panel A reports the regression results for a sub-sample of developed markets (11); and, Panel B for a sub-sample of emerging markets (22). Cap-weights are computed by using market capitalization at the beginning of the synthetic week (Wednesday-to-Wednesday) for each available Industry Sector index within each market. Both adjusted R^2s and Schwartz Bayesian Information Criterion (BIC) is also provided along with each model to compare the effectiveness of four model specifications. Significance at the 1% level is denoted by ***, at the 5% level by **, and at the 10% level by *.

Panel A: Developed Markets Only

Group	Sub-group	Country	Benchmark: ICAPM + EGARCH +LEV				Model I: Country Factor					Model II: Industry Factor					Model III: Country Factor + Industry Factor					
			FTSE	LEV	Adj. R-sq	BIC	FTSE	LEV	CNT	Adj. R-sq	BIC	FTSE	LEV	IND	Adj. R-sq	BIC	FTSE	LEV	CNT	IND	Adj. R-sq	BIC
DSM	G7	Canada	0.880***	<0.000	0.578	-2661.1	0.885***	<0.000	-1.940*	0.578	-2656.7	0.887***	<0.000	-9.521***	0.578	-2661.4	0.886***	<0.000	<0.000	-9.266***	0.577	-2655.3
			[0.032]	[0.128]			[0.034]	[0.151]	[1.279]			[0.033]	[0.157]	[3.661]			[0.033]	[0.167]	[1.356]	[3.909]		
		United States	1.056***	0.884*	0.857	-3214.0	1.056***	1.000*	-5.511**	0.856	-3210.3	1.058***	1.000*	-6.000	0.856	-3205.5	1.053***	1.000	-5.677**	21.000	0.855	-3205.4
			[0.017]	[0.645]			[0.018]	[0.759]	[2.974]			[0.018]	[0.737]	[16.648]			[0.018]	[0.678]	[3.003]	[18.765]		
		France	1.039***	-0.487*	0.602	-2516.8	1.031***	<0.000	-5.307***	0.600	-2519.8	1.037***	-0.481*	<0.000	0.601	-2510.6	1.028***	<0.000	-5.507***	-5.000	0.599	-2513.9
			[0.032]	[0.316]			[0.031]	[0.294]	[1.321]			[0.032]	[0.310]	[7.636]			[0.032]	[0.303]	[1.317]	[7.247]		
		Germany	1.159***	<0.000	0.633	-2500.5	1.159***	<0.000	-3.098**	0.631	-2497.9	1.160***	<0.000	-2.000	0.632	-2494.3	1.158***	<0.000	-3.160**	-1.000	0.630	-2491.7
			[0.032]	[0.121]			[0.033]	[0.126]	[1.532]			[0.033]	[0.145]	[4.944]			[0.033]	[0.149]	[1.570]	[5.003]		
		United Kingdom	0.808***	-0.952**	0.611	-2777.1	0.801***	-0.913*	-1.467*	0.610	-2771.7	0.807***	-0.959*	-3.000	0.611	-2771.3	0.804***	-0.916*	-1.000	-2.000	0.610	-2765.9
			[0.028]	[0.550]			[0.029]	[0.577]	[1.116]			[0.027]	[0.597]	[4.384]			[0.029]	[0.634]	[1.113]	[4.685]		
		Italy	1.034***	0.407*	0.377	-2154.7	1.007***	>0.000	1.026*	0.377	-2149.5	0.996***	0.533**	-1.000	0.377	-2148.3	0.999***	>0.000	1.000	-2.000	0.375	-2144.7
			[0.054]	[0.258]			[0.050]	[0.252]	[0.781]			[0.052]	[0.301]	[2.294]			[0.052]	[0.379]	[0.826]	[2.343]		
		Japan	0.678***	-0.514***	0.250	-2191.5	0.700***	-0.999***	6.082***	0.238	-2204.9	0.700***	-0.375***	-7.957**	0.250	-2186.9	0.709***	-0.853***	5.763***	-8.652*	0.238	-2201.3
			[0.039]	[0.121]			[0.033]	[0.334]	[1.019]			[0.041]	[0.130]	[4.289]			[0.034]	[0.306]	[1.022]	[5.462]		
	Asia/ Australasia	Australia	0.615***	-1.000	0.321	-2471.7	0.612***	-1.000	1.000	0.319	-2464.9	0.620***	-1.000	5.691**	0.319	-2463.6	0.615***	-1.000	1.000	5.571**	0.317	-2454.8
			[0.039]	[1.621]			[0.040]	[1.497]	[0.928]			[0.038]	[1.898]	[3.108]			[0.039]	[2.072]	[1.007]	[3.212]		
		New Zealand	0.528***	<0.000	0.150	-2183.6	0.528***	<0.000	<0.000	0.148	-2177.5	0.526***	<0.000	<0.000	0.148	-2176.9	0.527***	<0.000	<0.000	<0.000	0.147	-2170.9
			[0.043]	[0.372]			[0.043]	[0.453]	[0.679]			[0.043]	[0.394]	[1.458]			[0.043]	[0.463]	[0.732]	[1.553]		
		Hong Kong/China	0.829***	-0.391***	0.257	-2019.3	0.779***	<0.000	-3.136***	0.250	-2032.8	0.821***	-0.406***	-1.000	0.255	-2013.6	0.783***	<0.000	-3.069***	<0.000	0.249	-2026.6
			[0.057]	[0.163]			[0.051]	[0.169]	[0.643]			[0.058]	[0.165]	[1.010]			[0.051]	[0.183]	[0.659]	[1.135]		
		Singapore	0.644***	-0.467**	0.164	-1964.9	0.647***	<0.000	-1.170**	0.162	-1961.1	0.648***	-0.448**	-1.000	0.162	-1958.6	0.656***	<0.000	-1.222**	<0.000	0.161	-1954.8
			[0.054]	[0.210]			[0.054]	[0.206]	[0.615]			[0.054]	[0.200]	[1.491]			[0.054]	[0.197]	[0.643]	[1.656]		

Panel B: Emerging Markets Only

Group	Sub-group	Country	Benchmark: ICAPM + EGARCH +LEV				Model I: Country Factor					Model II: Industry Factor					Model III: Country Factor + Industry Factor					
			FTSE	LEV	Adj. R-sq	BIC	FTSE	LEV	CNT	Adj. R-sq	BIC	FTSE	LEV	IND	Adj. R-sq	BIC	FTSE	LEV	CNT	IND	Adj. R-sq	BIC
ESM	Advanced	Brazil	1.004***	-0.917***	0.179	-1436.1	1.193***	-0.399***	-2.129***	0.183	-1458.7	1.043***	-0.906***	4.766*	0.179	-1432.5	1.191***	-0.403***	-2.099***	>0.000	0.181	-1452.6
			[0.051]	[0.245]			[0.076]	[0.165]	[0.310]			[0.080]	[0.254]	[2.930]			[0.088]	[0.172]	[0.316]	[3.095]		
		Mexico	1.056***	-1.000***	0.235	-1755.3	1.065***	-0.973***	-1.386***	0.233	-1755.1	1.074***	-1.000***	1.000	0.235	-1748.8	1.068***	-0.978***	-1.194***	>0.000	0.232	-1748.7
			[0.063]	[0.333]			[0.063]	[0.328]	[0.403]			[0.062]	[0.330]	[2.618]			[0.064]	[0.330]	[0.411]	[2.454]		
		Israel	0.622***	-0.476*	0.143	-1955.0	0.650***	<0.000	-3.681***	0.134	-1961.6	0.624***	-0.496*	2.000	0.141	-1949.4	0.651***	<0.000	-3.672***	2.000	0.133	-1955.8
			[0.061]	[0.305]			[0.062]	[0.377]	[0.823]			[0.061]	[0.319]	[2.383]			[0.062]	[0.374]	[0.818]	[2.466]		
		Korea	1.037***	-0.469***	0.166	-1557.3	1.029***	-0.472***	>0.000	0.164	-1550.8	1.019***	-0.515***	1.000	0.163	-1551.1	1.019***	-0.471**	>0.000	1.000	0.161	-1545.1
			[0.089]	[0.180]			[0.091]	[0.202]	[0.297]			[0.092]	[0.210]	[1.417]			[0.092]	[0.210]	[0.322]	[1.562]		
		Taiwan/China	0.672***	-0.307**	0.117	-1749.9	0.669***	-0.321*	>0.000	0.115	-1744.0	0.663***	<0.000	-2.000	0.115	-1744.5	0.664***	<0.000	>0.000	-2.000	0.114	-1738.4
			[0.078]	[0.183]			[0.079]	[0.201]	[0.611]			[0.080]	[0.196]	[1.997]			[0.080]	[0.230]	[0.602]	[1.855]		
		South Africa	0.695***	-0.769***	0.171	-1989.9	0.690***	-0.637**	-1.055*	0.169	-1985.5	0.690***	-0.721***	1.000	0.169	-1984.1	0.686***	-0.616**	-1.086*	1.000	0.167	-1979.8
			[0.059]	[0.284]			[0.058]	[0.324]	[0.731]			[0.059]	[0.270]	[1.658]			[0.058]	[0.319]	[0.727]	[1.762]		
	Asia	India	0.214***	-0.443***	0.011	-1829.1	0.198***	-0.457**	2.320***	0.005	-1824.8	0.218***	-0.639**	2.524*	0.009	-1826.0	0.215***	-0.519***	1.751**	3.505*	0.005	-1819.7
			[0.069]	[0.184]			[0.072]	[0.196]	[0.759]			[0.068]	[0.295]	[1.737]			[0.070]	[0.215]	[0.756]	[2.662]		
		Pakistan	0.187**	-0.170*	-0.010	-1502.4	0.187**	<0.000	<0.000	-0.011	-1496.3	0.174**	-0.126*	-5.666***	-0.012	-1499.8	0.161*	<0.000	-1.000	-6.585***	-0.013	-1494.4
			[0.103]	[0.114]			[0.106]	[0.138]	[0.526]			[0.105]	[0.093]	[2.086]			[0.101]	[0.126]	[0.581]	[2.228]		
		China	0.259***	<0.000	0.001	-1639.6	0.259***	-0.134**	1.010***	-0.001	-1636.7	0.259***	<0.000	-2.000	-0.001	-1633.9	0.252***	<0.000	0.974**	-1.000	-0.003	-1630.5
			[0.080]	[0.071]			[0.081]	[0.079]	[0.406]			[0.080]	[0.085]	[2.557]			[0.080]	[0.098]	[0.428]	[2.776]		
		Indonesia	0.294***	-0.245**	0.002	-898.2	0.310***	<0.000	-0.421*	-0.002	-893.8	0.212***	-0.362**	-3.668***	-0.003	-896.9	0.233***	<0.000	<0.000	-3.409**	-0.006	-891.6
			[0.074]	[0.124]			[0.075]	[0.175]	[0.276]			[0.075]	[0.170]	[1.558]			[0.079]	[0.212]	[0.277]	[1.570]		
		Malaysia	0.312***	-0.727***	0.028	-1815.2	0.317***	-0.755***	>0.000	0.027	-1809.2	0.307***	-0.775***	-2.000	0.026	-1809.4	0.310***	-0.836***	0.564*	-2.671*	0.024	-1803.6
			[0.061]	[0.148]			[0.061]	[0.155]	[0.361]			[0.061]	[0.186]	[1.804]			[0.063]	[0.210]	[0.372]	[1.940]		
		Philippines	0.438***	-0.332***	0.042	-1179.3	0.440***	-0.292***	<0.000	0.039	-1173.6	0.429***	-0.353***	2.000	0.038	-1174.7	0.434***	-0.325***	<0.000	2.000	0.036	-1168.9
			[0.078]	[0.116]			[0.078]	[0.120]	[0.377]			[0.082]	[0.121]	[1.525]			[0.081]	[0.132]	[0.417]	[1.605]		
		Thailand	0.637***	-0.456**	0.071	-1277.0	0.634***	-0.430*	<0.000	0.068	-1271.0	0.633***	-0.481**	-1.000	0.069	-1271.1	0.630***	-0.457*	<0.000	-1.000	0.066	-1265.0
			[0.083]	[0.235]			[0.082]	[0.266]	[0.421]			[0.082]	[0.243]	[1.980]			[0.082]	[0.284]	[0.433]	[2.018]		
	Europe	Czech Republic	0.577***	-1.000	0.095	-1298.0	0.557***	-1.000	1.000	0.093	-1291.6	0.587***	-1.000	-4.000	0.092	-1292.2	0.588***	-1.000	>0.000	-3.000	0.090	-1286.5
			[0.081]	[3.667]			[0.080]	[12.040]	[1.169]			[0.081]	[2.503]	[5.156]			[0.080]	[3.400]	[0.956]	[5.262]		
		Hungary	0.782***	-1.000	0.216	-1067.5	0.781***	-0.994*	1.000	0.213	-1062.2	0.786***	-1.000	-5.058*	0.213	-1063.6	0.791***	-0.886*	>0.000	-4.861*	0.211	-1058.1
			[0.075]	[0.805]			[0.076]	[0.770]	[0.812]			[0.073]	[0.732]	[3.635]			[0.075]	[0.670]	[0.925]	[3.699]		
		Poland	0.762***	-0.444***	0.101	-1631.5	0.763***	-0.680***	0.935**	0.099	-1629.1	0.752***	-0.464**	-3.178**	0.099	-1628.1	0.754***	-0.696***	0.954**	-2.000	0.097	-1624.8
			[0.073]	[0.171]			[0.071]	[0.245]	[0.442]			[0.071]	[0.211]	[1.724]			[0.071]	[0.283]	[0.442]	[1.722]		
		Turkey	0.849***	>0.000	0.053	-1080.3	0.811***	0.644**	-1.583***	0.039	-1085.4	0.859***	>0.000	5.897***	0.052	-1082.3	0.863***	0.724**	-1.495***	6.197***	0.042	-1085.3
			[0.136]	[0.143]			[0.137]	[0.336]	[0.372]			[0.142]	[0.164]	[2.150]			[0.141]	[0.359]	[0.375]	[2.444]		
		Russia	0.827***	-1.000	0.079	-701.4	0.834***	-1.000	<0.000	0.077	-695.0	0.897***	-1.000	-2.547**	0.080	-699.8	0.869***	-1.000	-0.427*	-2.958***	0.074	-700.6
			[0.117]	[0.949]			[0.121]	[1.371]	[0.297]			[0.115]	[1.415]	[1.240]			[0.113]	[14.977]	[0.320]	[1.157]		
	Lat. America	Argentina	0.906***	-0.229***	0.103	-1558.6	0.940***	<0.000	-1.634***	0.099	-1557.2	0.890***	-0.228***	-3.511**	0.102	-1554.8	0.912***	<0.000	-1.637***	-3.156**	0.098	-1553.6
			[0.081]	[0.084]			[0.082]	[0.112]	[0.504]			[0.077]	[0.088]	[1.821]			[0.080]	[0.109]	[0.515]	[1.634]		
		Chile	0.503***	-0.310***	0.123	-2025.2	0.494***	-0.379***	2.585***	0.121	-2027.3	0.506***	-0.382***	-2.000	0.122	-2019.7	0.499***	-0.432***	1.731***	-1.000	0.119	-2023.2
			[0.055]	[0.117]			[0.050]	[0.114]	[0.768]			[0.051]	[0.161]	[1.809]			[0.047]	[0.181]	[0.681]	[1.537]		
		Colombia	0.161**	-0.190**	0.002	-1767.3	0.198***	-0.329***	3.944***	-0.006	-1790.6	0.159**	-0.196**	-5.574*	0.000	-1763.3	0.195***	-0.334***	3.909***	-2.000	-0.007	-1784.6
			[0.076]	[0.098]			[0.069]	[0.103]	[0.446]			[0.074]	[0.095]	[4.003]			[0.069]	[0.107]	[0.479]	[4.200]		
		Peru	0.173***	-0.436**	0.014	-1805.8	0.171***	-0.426**	<0.000	0.011	-1799.6	0.173***	-0.451**	1.742*	0.012	-1801.1	0.173***	-0.460**	>0.000	1.754*	0.010	-1794.9
			[0.072]	[0.195]			[0.072]	[0.208]	[0.507]			[0.073]	[0.195]	[1.228]			[0.074]	[0.218]	[0.523]	[1.237]		



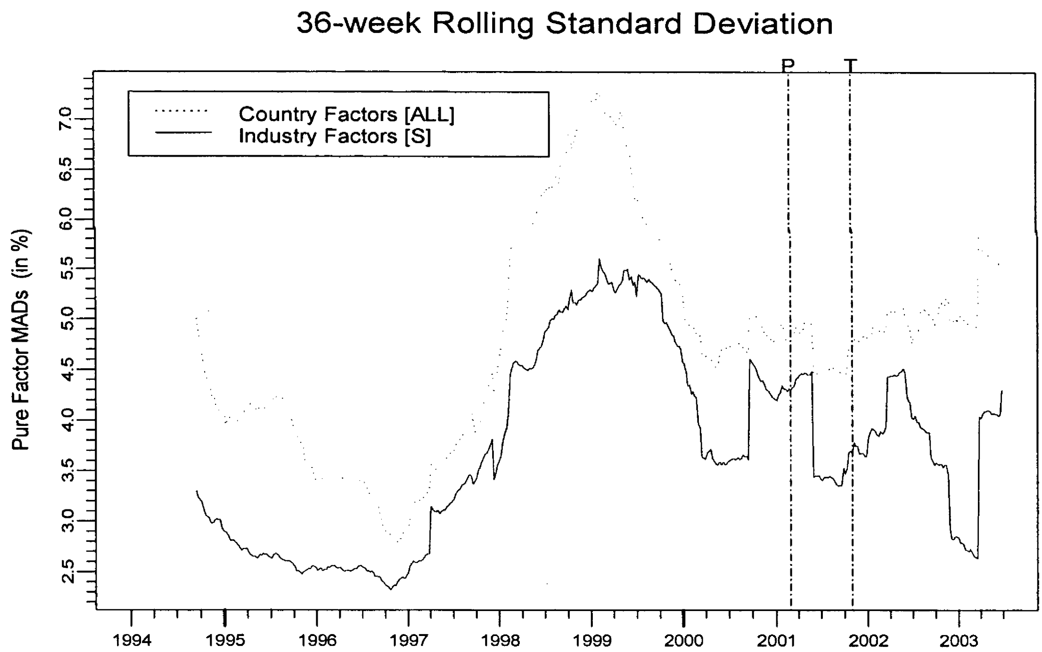
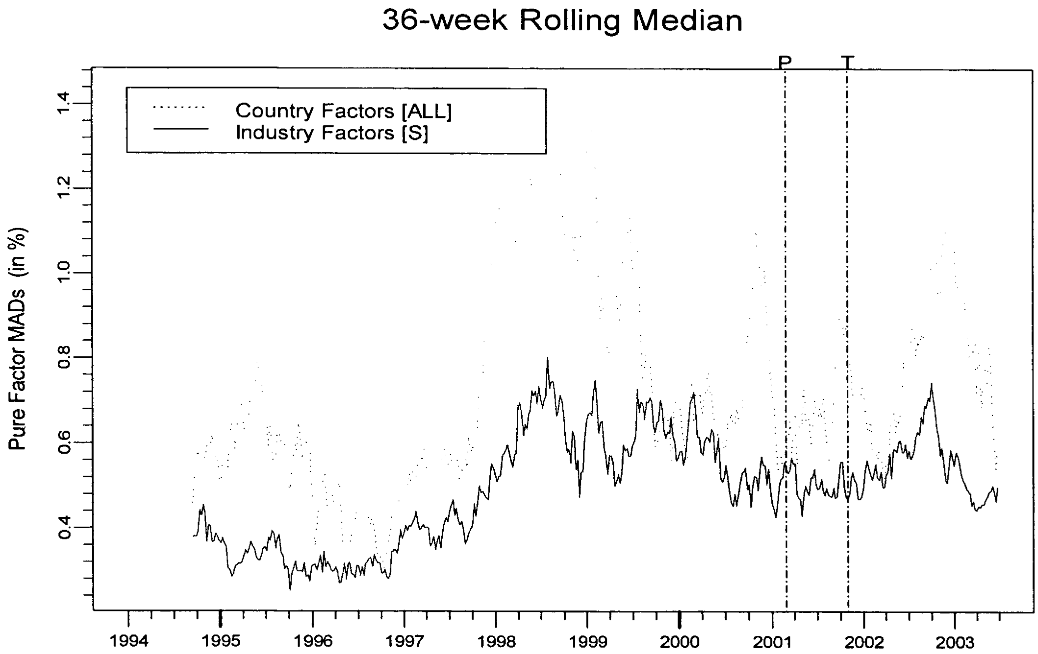


Figure C.1. 36-week rolling averages and standard deviations of equally-weighted aggregate industry (39 FTSE Industry Sectors) and country factors (all 33 markets) during the period 1994 – 2003.

In these plots, industry (country) factors are aggregated as the cross-sectional averages of absolute values of the estimated factor loadings for all 39 FTSE Industry Sectors (all 33 markets). Within each rolling window, means and standard deviations are computed for each aggregate factor. "P" and "T" denote the peak and trough dates of the U.S. business cycles as identified by National Bureau of Economic Research during 1994 - 2003.



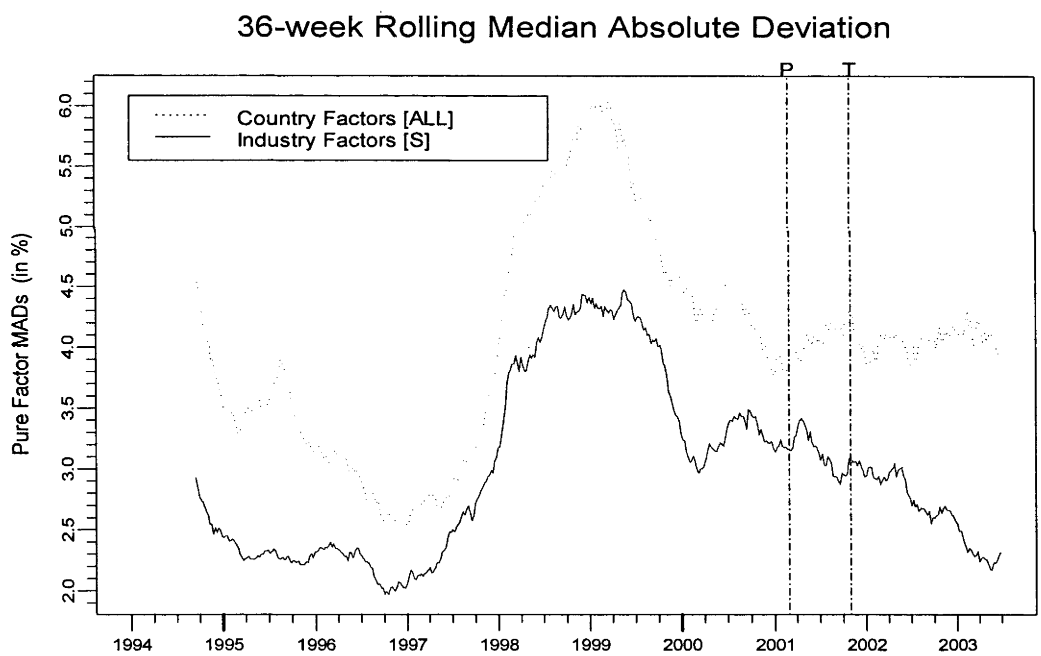
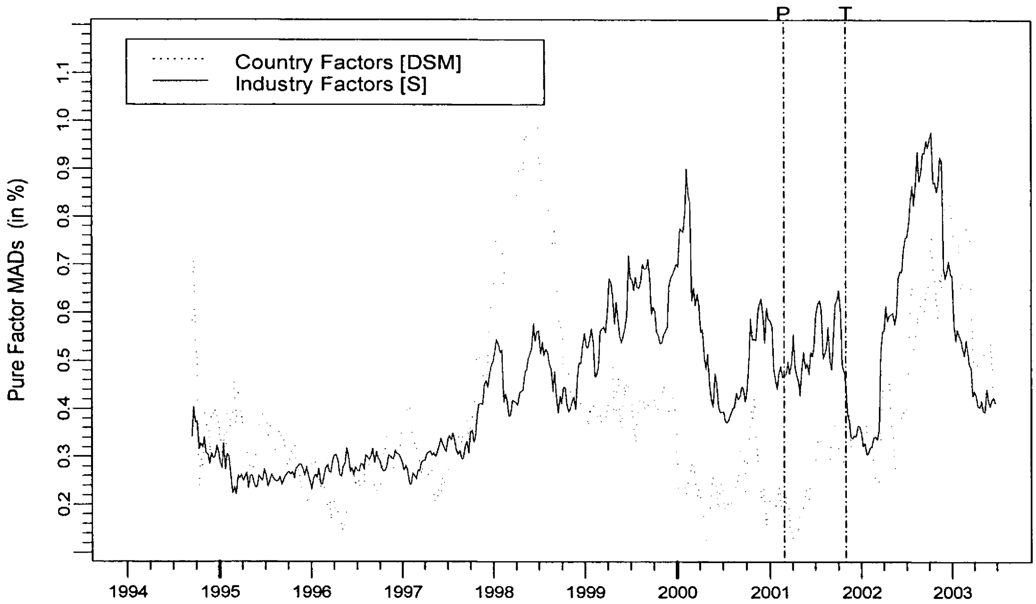


Figure C.2. 36-week rolling medians and MADs of equally-weighted aggregate industry (39 FTSE Industry Sectors) and country factors (all 33 markets) during the period 1994 – 2003.

In these plots, industry (country) factors are aggregated as the cross-sectional averages of absolute values of the estimated factor loadings for all 39 FTSE Industry Sectors (all 33 markets). Within each rolling window, medians and median absolute deviations (center is defined as median) are computed for each aggregate factor. "P" and "T" denote the peak and trough dates of the U.S. business cycles as identified by National Bureau of Economic Research during 1994 - 2003.

36-week Rolling Average



36-week Rolling Standard Deviation

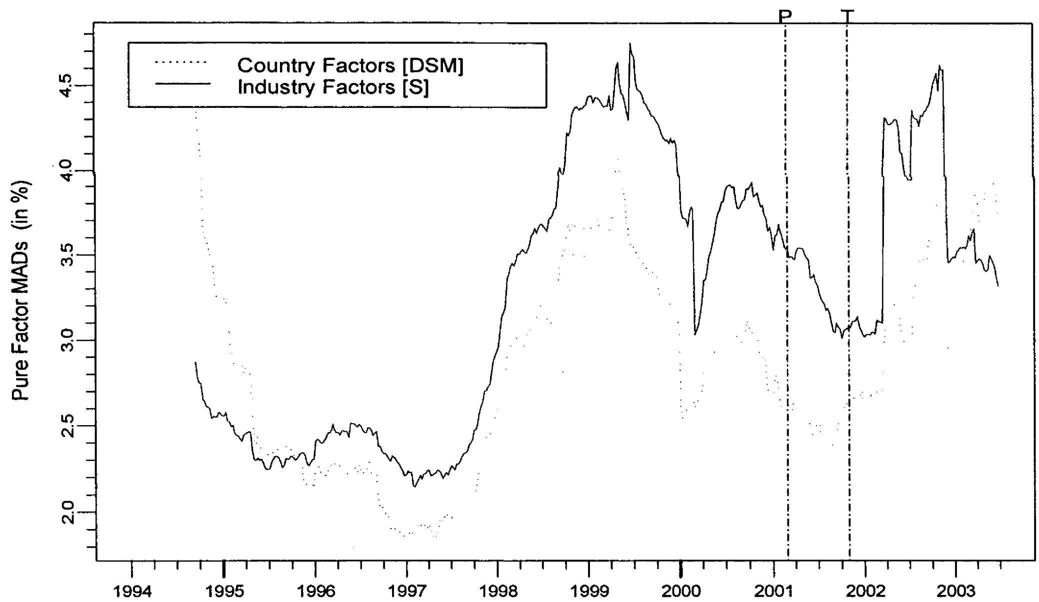
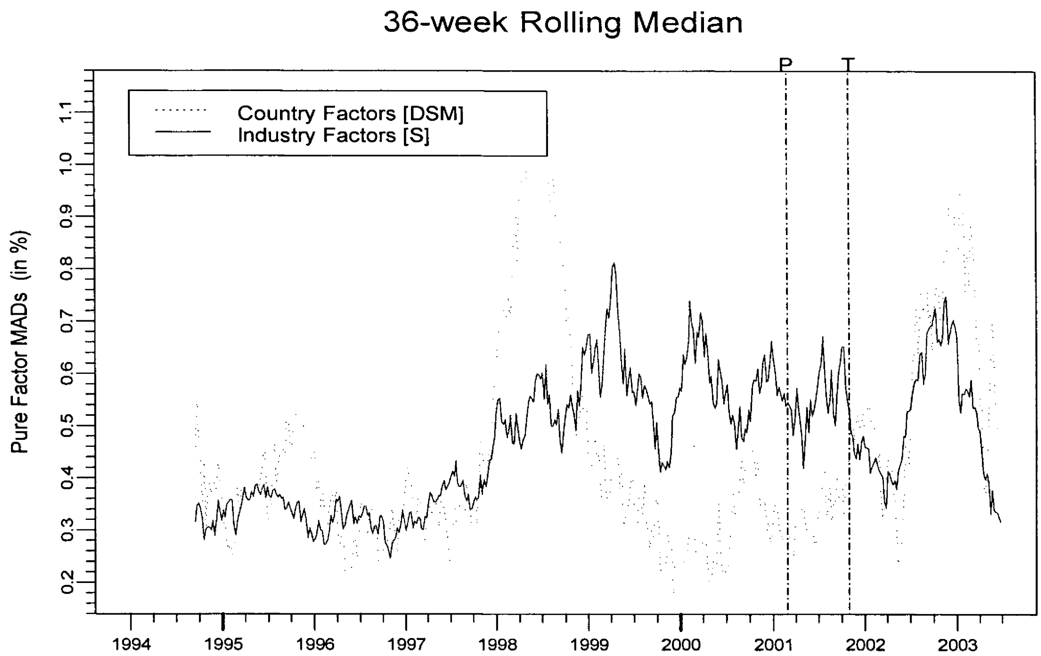


Figure C.3. 36-week rolling averages and standard deviations of equally-weighted aggregate industry (39 FTSE Industry Sectors) and country factors (all 11 developed markets) during the period 1994 –2003.

\In these plots, industry (country) factors are aggregated as the cross-sectional averages of absolute values of the estimated factor loadings for all 39 FTSE Industry Sectors (all 11 developed markets). Within each rolling window, means and standard deviations are computed for each aggregate factor. "P" and "T" denote the peak and trough dates of the U.S. business cycles as identified by National Bureau of Economic Research during 1994 - 2003.



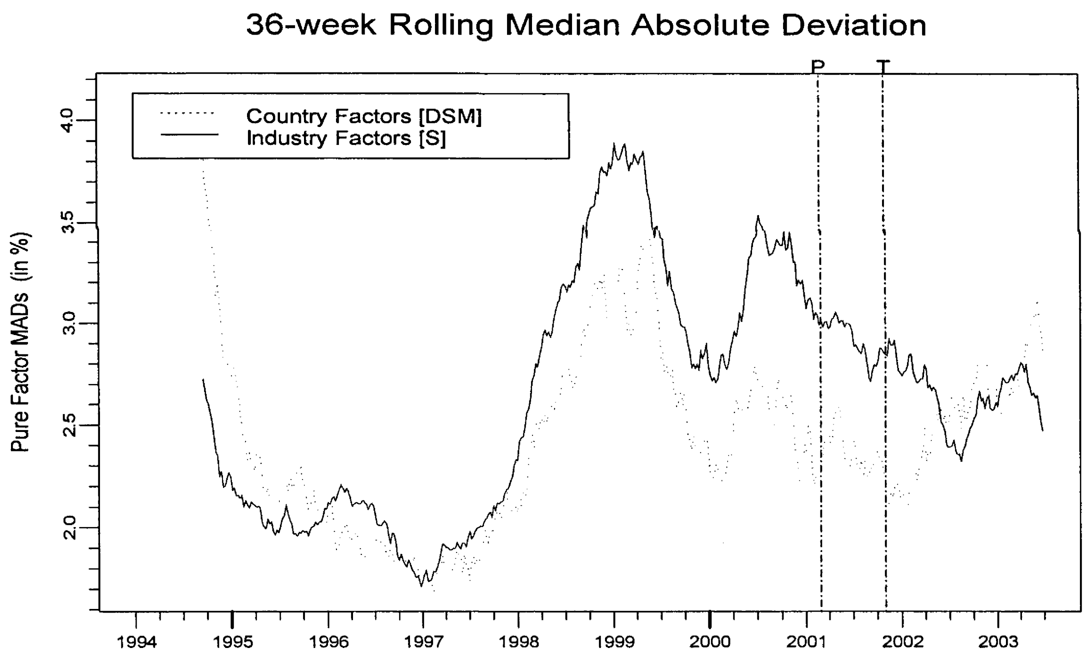


Figure C.4. 36-week rolling medians and MADs of equally-weighted aggregate industry (39 FTSE Industry Sectors) and country factors (all 11 developed markets) during the period 1994 – 2003.

In these plots, industry (country) factors are aggregated as the cross-sectional averages of absolute values of the estimated factor loadings for all 39 FTSE Industry Sectors (all 11 developed markets). Within each rolling window, medians and median absolute deviations (center is defined as median) are computed for each aggregate factor. "P" and "T" denote the peak and trough dates of the U.S. business cycles as identified by National Bureau of Economic Research during 1994 - 2003.

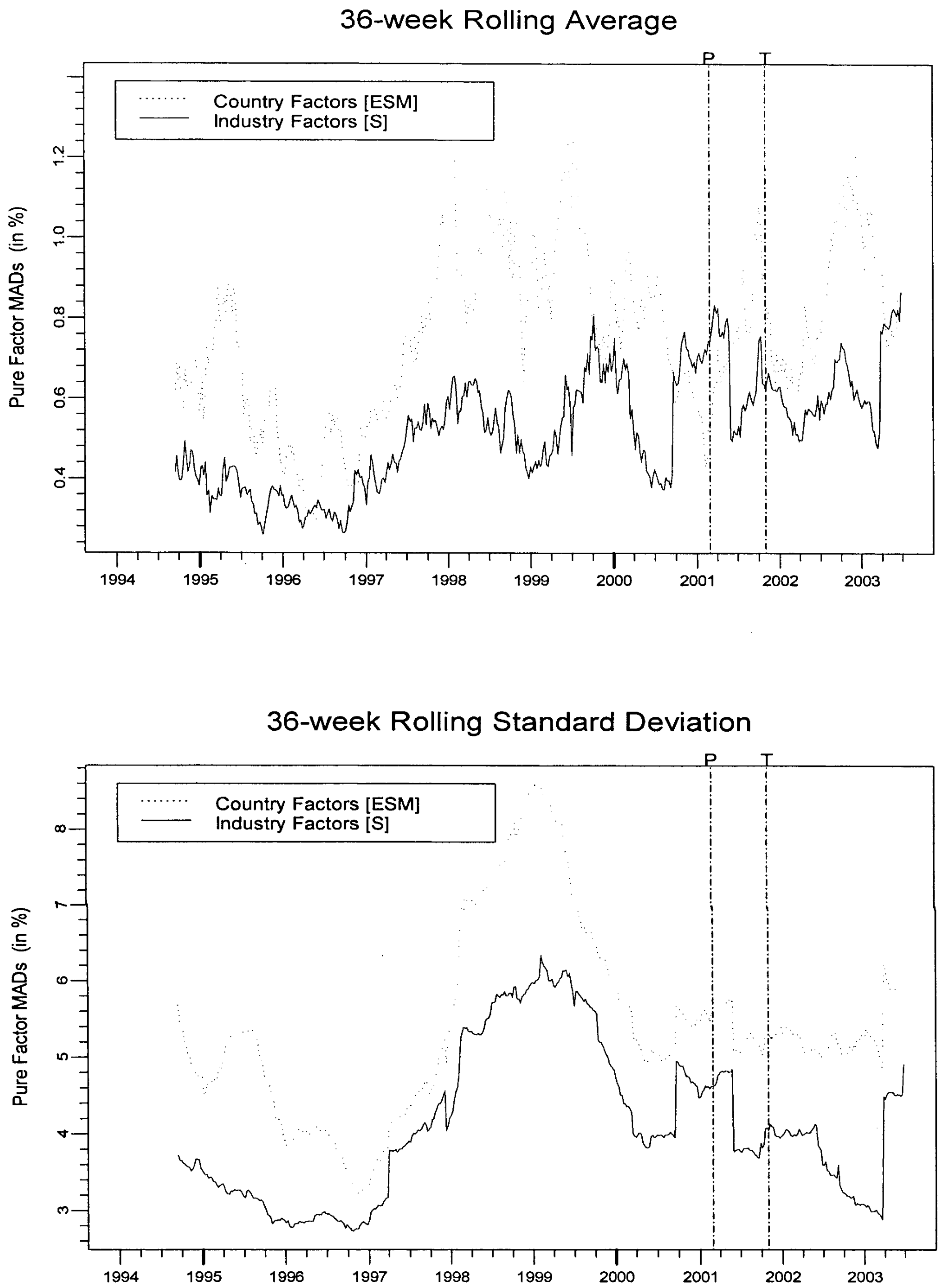
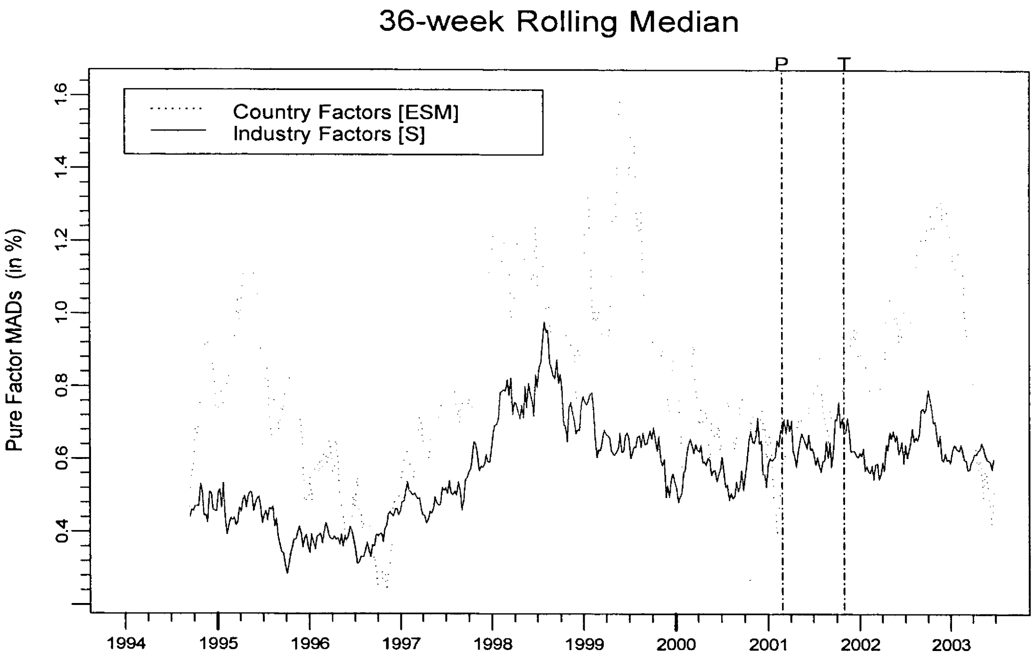


Figure C.5. 36-week rolling averages and standard deviations of equally-weighted aggregate industry (39 FTSE Industry Sectors) and country factors (all 22 emerging markets) during the period 1994 – 2003.

In these plots, industry (country) factors are aggregated as the cross-sectional averages of absolute values of the estimated factor loadings for all 39 FTSE Industry Sectors (all 22 emerging markets).. Within each rolling window, means and standard deviations are computed for each aggregate factor. "P" and "T" denote the peak and trough dates of the U.S. business cycles as identified by National Bureau of Economic Research during 1994 - 2003.



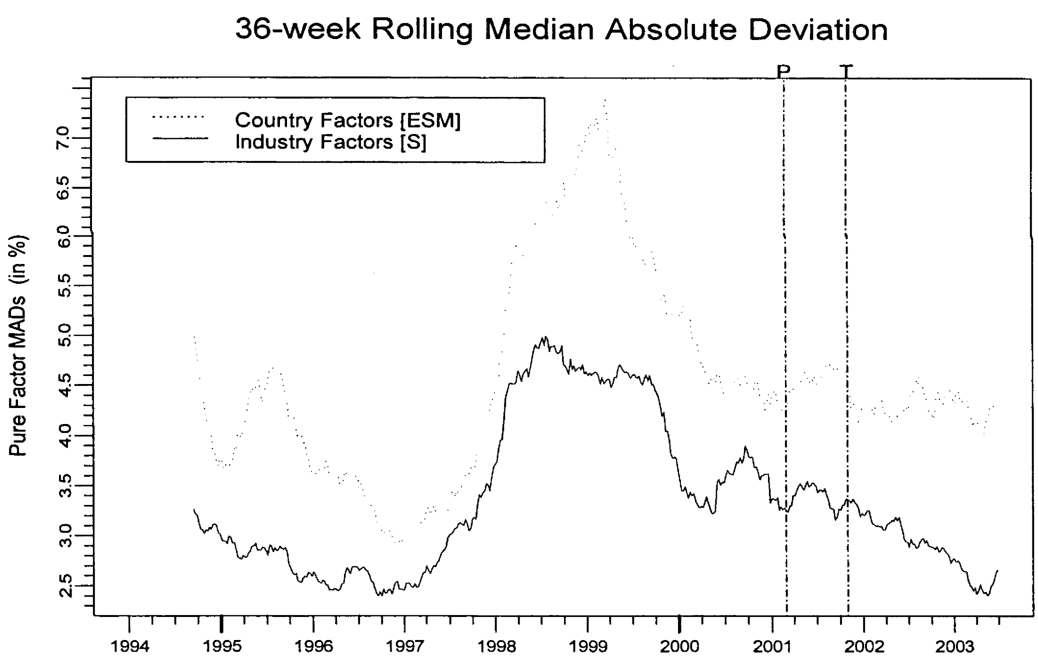
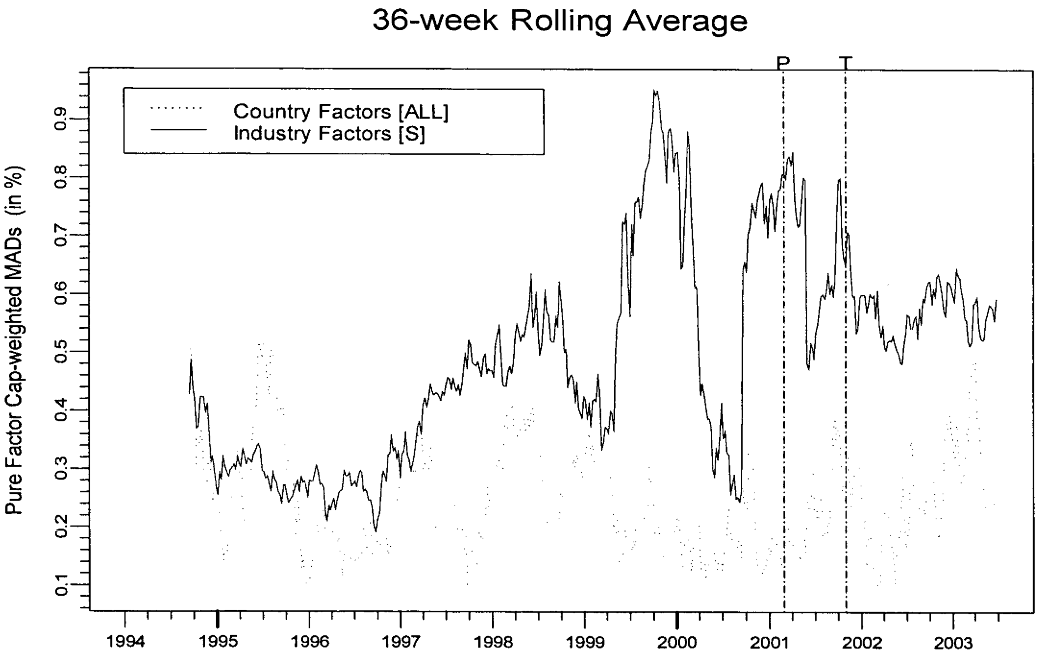


Figure C.6. 36-week rolling medians and MADs of equally-weighted aggregate industry (39 FTSE Industry Sectors) and country factors (all 22 emerging markets) during the period 1994 – 2003.

In these plots, industry (country) factors are aggregated as the cross-sectional averages of absolute values of the estimated factor loadings for all 39 FTSE Industry Sectors (all 22 emerging markets). Within each rolling window, medians and median absolute deviations (center is defined as median) are computed for each aggregate factor. "P" and "T" denote the peak and trough dates of the U.S. business cycles as identified by National Bureau of Economic Research during 1994 - 2003.



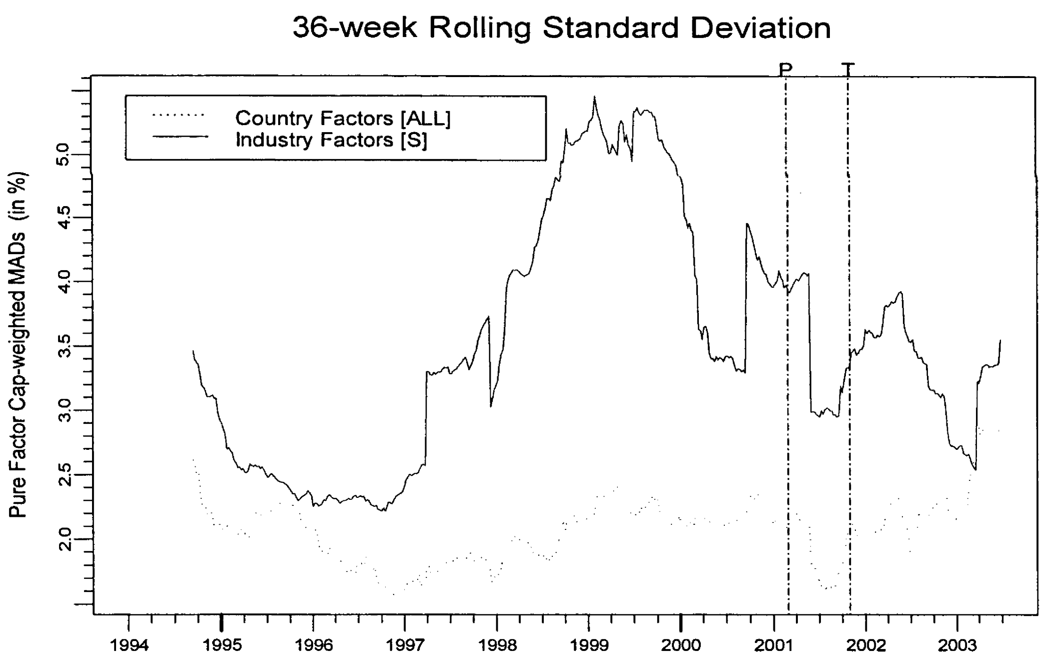
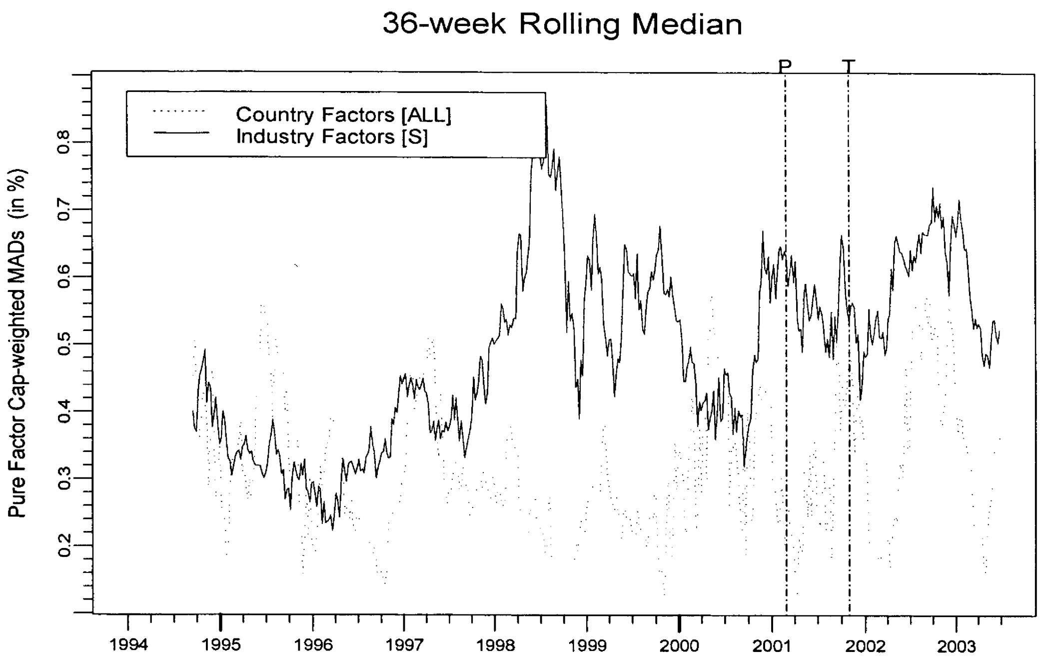


Figure C.7. 36-week rolling averages and standard deviations of value-weighted aggregate industry (39 FTSE Industry Sectors) and country factors (all 33 markets) during the period 1994 – 2003.

In these plots, industry (country) factors are aggregated as the cross-sectional value-weighted absolute values of the estimated factor loadings for all 39 FTSE Industry Sectors (all 33 markets). Cap-weights are computed using market capitalization at the beginning of a synthetic week (Wednesday-to-Wednesday) for the corresponding industries (countries). Within each rolling window, means and standard deviations are computed for each aggregate factor. "P" and "T" denote the peak and trough dates of the U.S. business cycles as identified by National Bureau of Economic Research during 1994 - 2003.



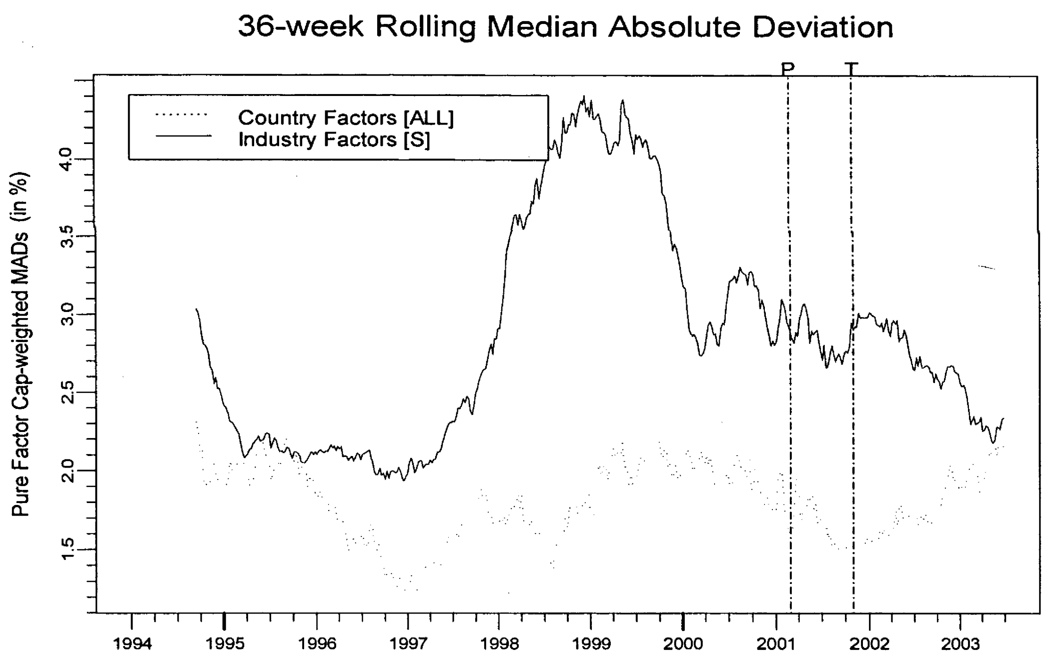


Figure C.8. 36-week rolling medians and MADs of value-weighted aggregate industry (39 FTSE Industry Sectors) and country factors (all 33 markets) during the period 1994 – 2003.

In these plots, industry (country) factors are aggregated as the cross-sectional value-weighted absolute values of the estimated factor loadings for all 39 FTSE Industry Sectors (all 33 markets). Cap-weights are computed using market capitalization at the beginning of a synthetic week (Wednesday-to-Wednesday) for the corresponding industries (countries). Within each rolling window, medians and median absolute deviations (center is defined as median) are computed for each aggregate factor. "P" and "T" denote the peak and trough dates of the U.S. business cycles as identified by National Bureau of Economic Research during 1994 - 2003.

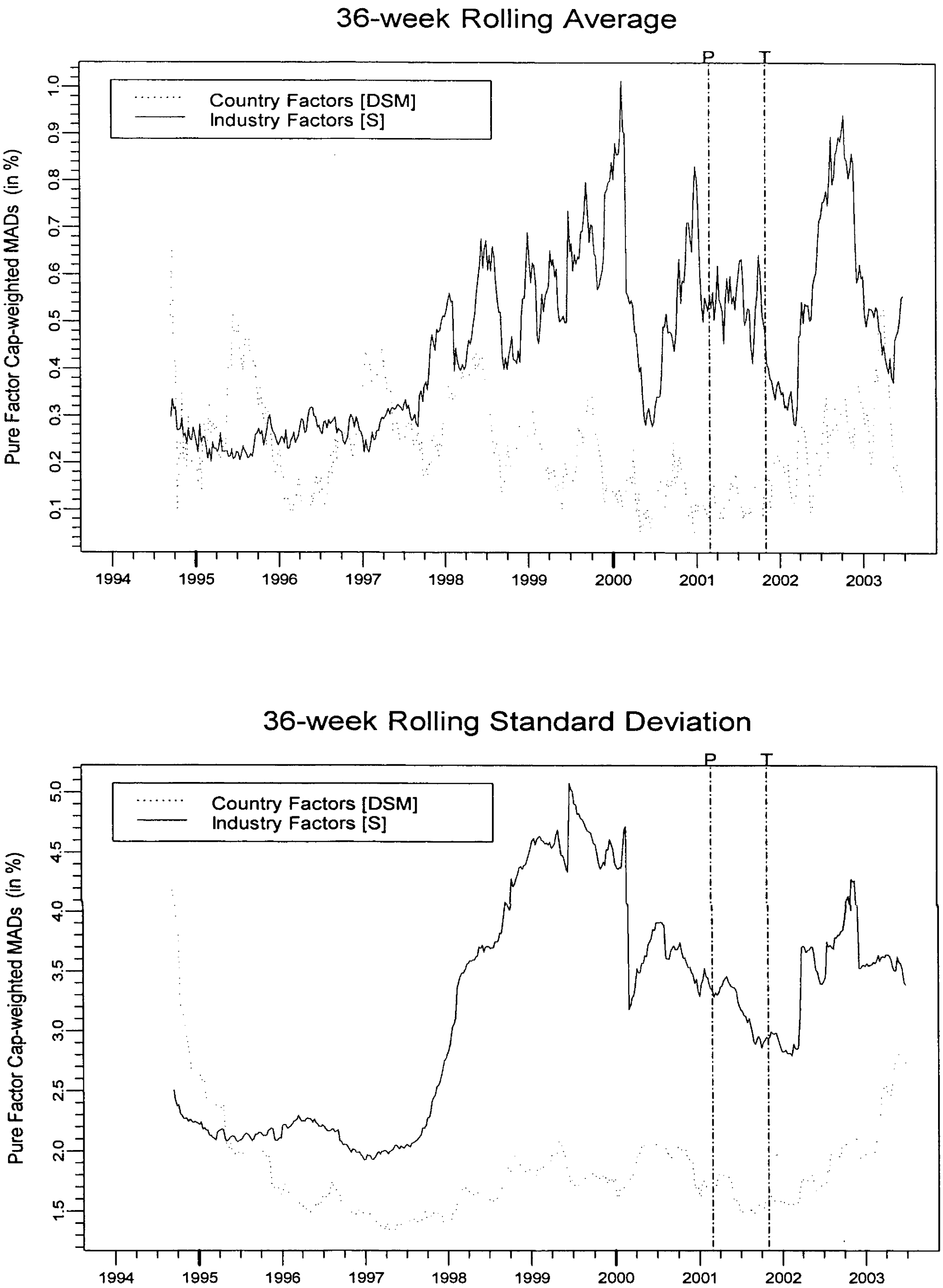
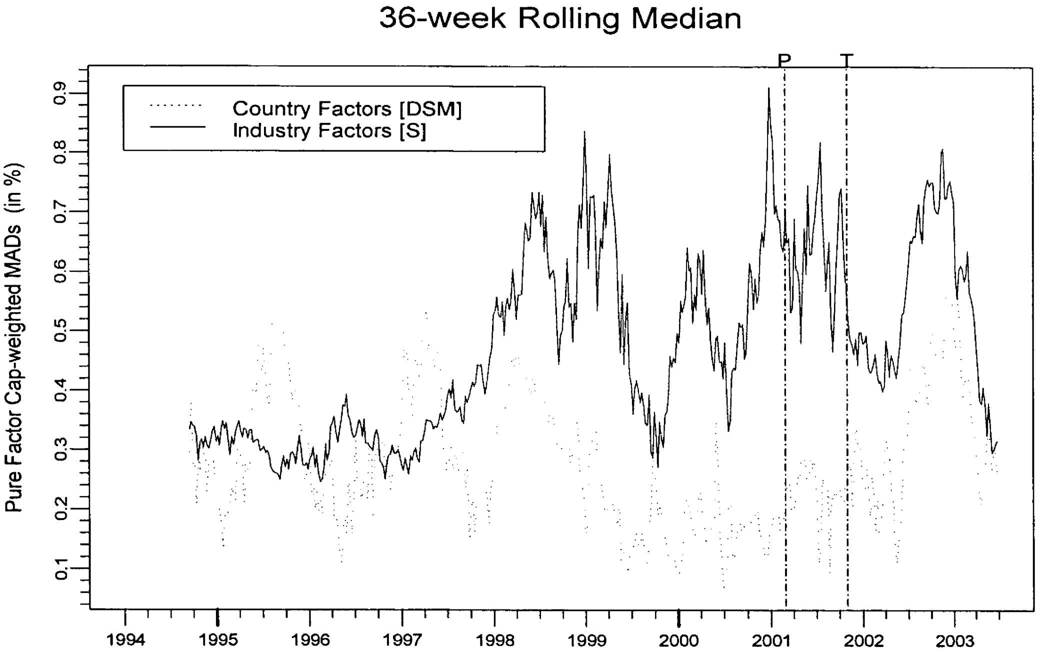


Figure C.9. 36-week rolling averages and standard deviations of value-weighted aggregate industry (39 FTSE Industry Sectors) and country factors (all 11 developed markets) during the period 1994 – 2003.

In these plots, industry (country) factors are aggregated as the cross-sectional value-weighted absolute values of the estimated factor loadings for all 39 FTSE Industry Sectors (all 11 developed markets). Cap-weights are computed using market capitalization at the beginning of a synthetic week (Wednesday-to-Wednesday) for the corresponding industries (countries). Within each rolling window, means and standard deviations are computed for each aggregate factor. "P" and "T" denote the peak and trough dates of the U.S. business cycles as identified by National Bureau of Economic Research during 1994 - 2003.



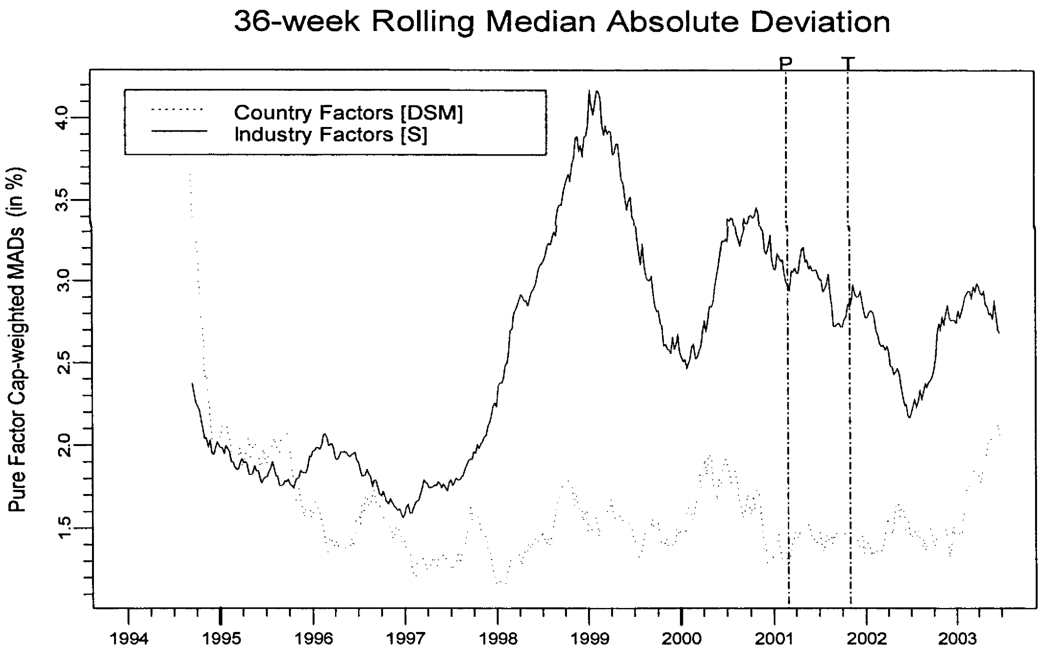
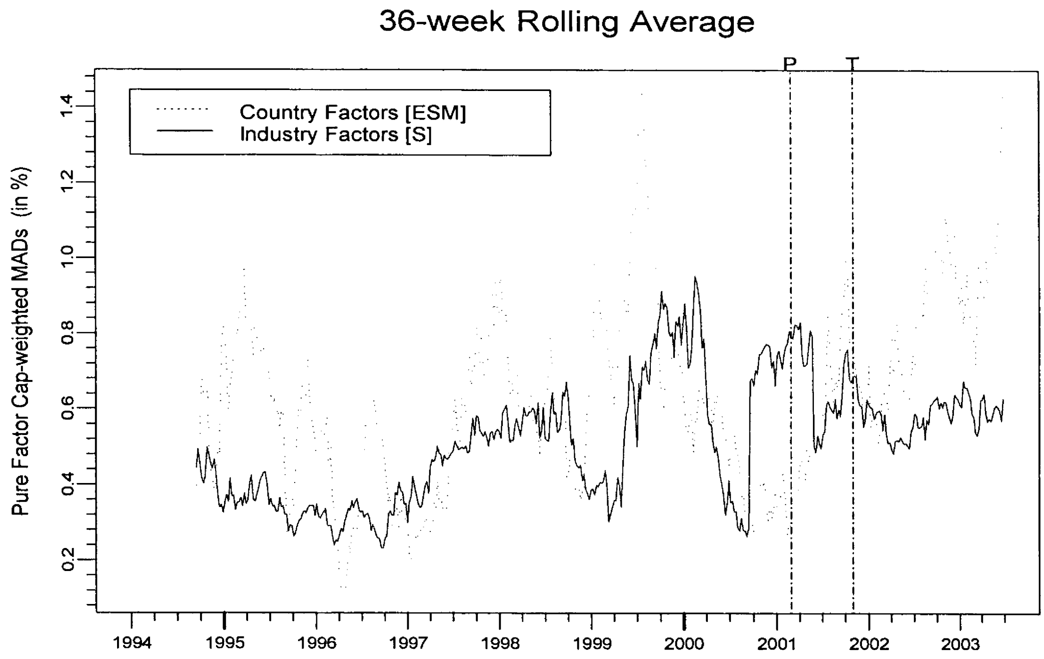


Figure C.10. 36-week rolling medians and MADs of value-weighted aggregate industry (39 FTSE Industry Sectors) and country factors (all 11 developed markets) during the period 1994 – 2003.

In these plots, industry (country) factors are aggregated as the cross-sectional value-weighted absolute values of the estimated factor loadings for all 39 FTSE Industry Sectors (all 11 developed markets). Cap-weights are computed using market capitalization at the beginning of a synthetic week (Wednesday-to-Wednesday) for the corresponding industries (countries). Within each rolling window, medians and median absolute deviations (center is defined as median) are computed for each aggregate factor. "P" and "T" denote the peak and trough dates of the U.S. business cycles as identified by National Bureau of Economic Research during 1994 - 2003.



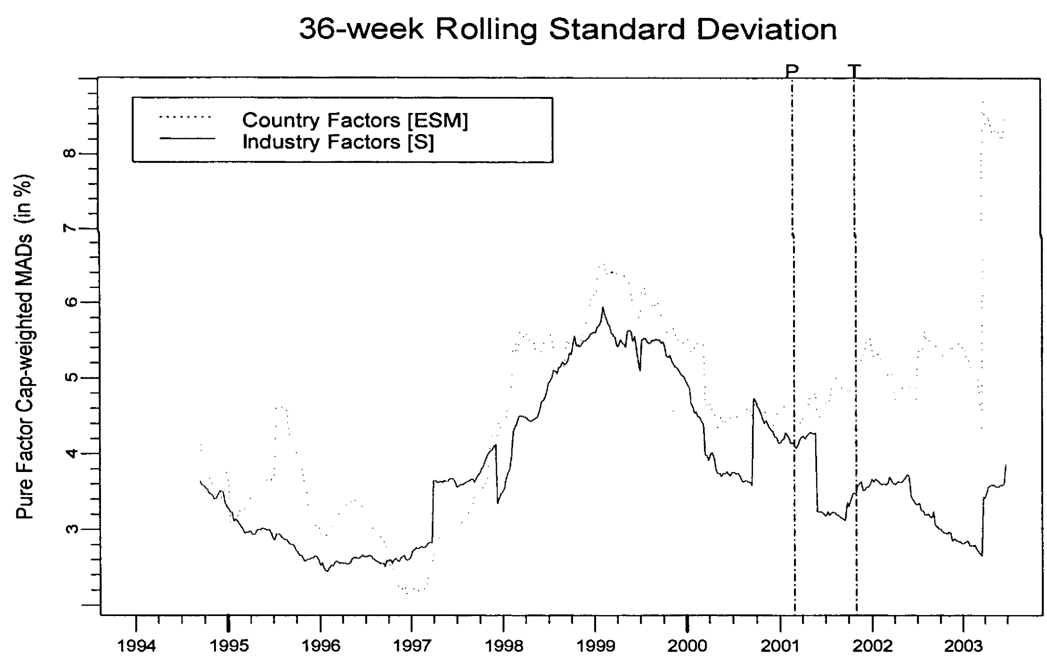
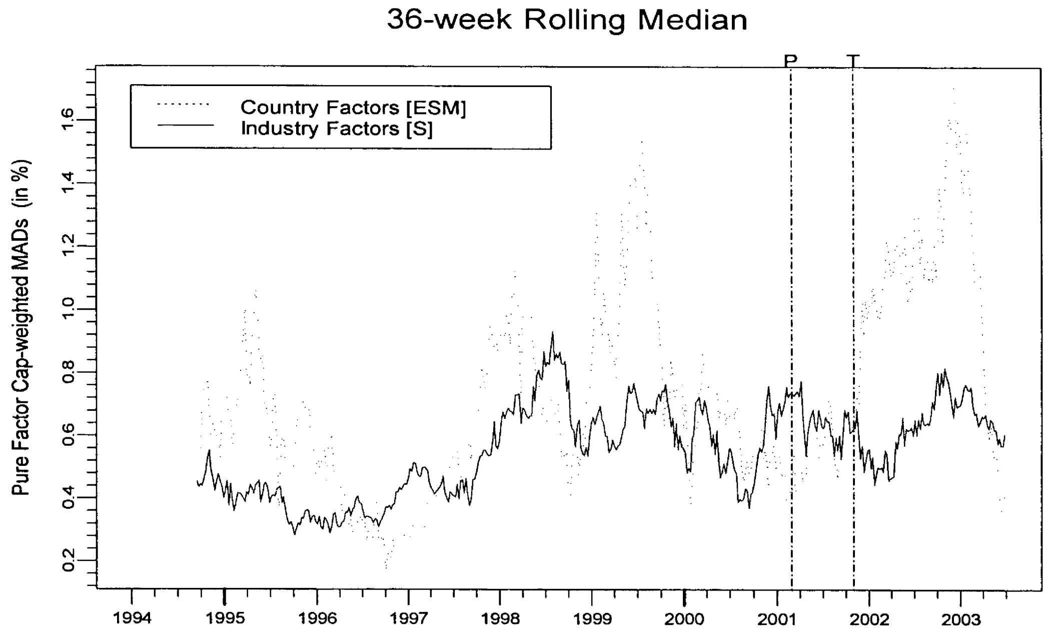


Figure C.11. 36-week rolling averages and standard deviations of value-weighted aggregate industry (39 FTSE Industry Sectors) and country factors (all 22 emerging markets) during the period 1994 – 2003.

In these plots, industry (country) factors are aggregated as the cross-sectional value-weighted absolute values of the estimated factor loadings for all 39 FTSE Industry Sectors (all 22 emerging markets). Cap-weights are computed using market capitalization at the beginning of a synthetic week (Wednesday-to-Wednesday) for the corresponding industries (countries). Within each rolling window, means and standard deviations are computed for each aggregate factor. "P" and "T" denote the peak and trough dates of the U.S. business cycles as identified by National Bureau of Economic Research during 1994 - 2003.



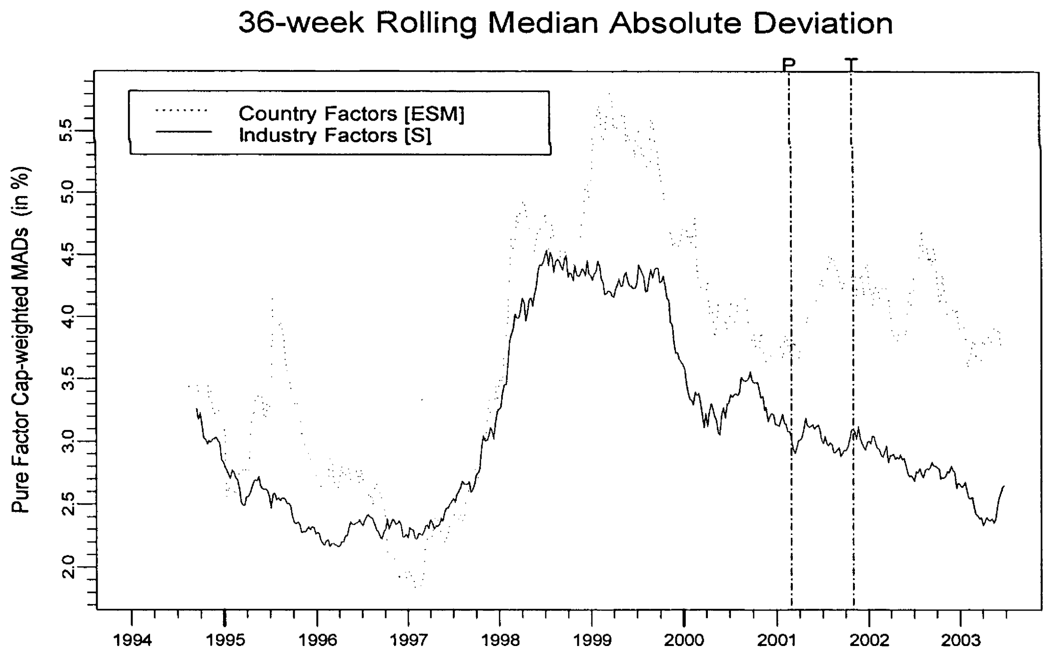


Figure C.12. 36-week rolling medians and MADs of value-weighted aggregate industry (39 FTSE Industry Sectors) and country factors (all 22 emerging markets) during the period 1994 – 2003.

In these plots, industry (country) factors are aggregated as the cross-sectional value-weighted absolute values of the estimated factor loadings for all 39 FTSE Industry Sectors (all 22 emerging markets). Cap-weights are computed using market capitalization at the beginning of a synthetic week (Wednesday-to-Wednesday) for the corresponding industries (countries). Within each rolling window, medians and median absolute deviations (center is defined as median) are computed for each aggregate factor. "P" and

"T" denote the peak and trough dates of the U.S. business cycles as identified by National Bureau of Economic Research during 1994 - 2003.

APPENDIX D

Appendices to Chapter VI

Appendix D.1

Time Series Regression (OLS) of Excess Country Index Return (U.S. Dollar-Denominated) on Excess World Market Index Return, Value-Weighted Cumulative Industry Factors, Country Factors, and Regional Factors within a Sub-Sample of 20 Emerging [Stock] Markets (January 1994 – June 2003)

This table reports the estimated coefficients for each factor, i.e., a world market factor (FTSE), a country factor (CNT), a value-weighted [cumulative] industry factor (IND), and a regional factor (REGN), from the OLS regression for each country. Newey and West (1987) heteroscedasticity and autocorrelation consistent (HAC) standard errors are reported for each coefficient (in square brackets), along with some residual diagnostics for four time series regression models specified for each country. Three time series regressions models are: (1) ICAPM + Country Effect: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t}$ + [Country Effect]$_{k,t}$; (2) ICAPM + Regional Effect: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t}$ + [Regional Effect]$_{k,t}$; and, (3) ICAPM + Country Effect + Regional Effect + Cum. Industry Factors: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t}$ + [Country Effect]$_{k,t}$ + [Regional Effect]$_{k,t}$ + [Cum. Industry Effect]$_{k,t}$. r_k (r_{FTSE}) is the weekly excess return of country k (a world market portfolio) above a one-week Eurodollar deposit rate. Cumulative industry factors, country factors and regional factors are estimated from a two-stage dummy variable regression of Heston and Rouwenhorst (1994). That is, in the first stage, value-weighted cumulative industry via the dummy variable regression model, in which both country and industry dummies are considered and weekly, U.S. dollar-denominated industry returns on all available FTSE Industry Sector indices in all sample markets (33) are used. In a second stage, country and regional factors are estimated from the country returns, net off industry factors, via a similar dummy variable regression model, in which only regional dummies are included within a sub-sample of 20 emerging markets. Cap-weights are computed by using market capitalization at the beginning of the synthetic week (Wednesday-to-Wednesday) for each available Industry Sector index within each market. Schwartz Bayesian Information Criterion (BIC) is also provided along with each model to compare the effectiveness of four model specifications. Significance at the 1% level is denoted by ***, at the 5% level by **, and at the 10% level by *.

Region	Country	Country Effect					Regional Effect					Country Effect + Regional Effect + Cum. Industry Effects						
		FTSE	CNT	Adj. R-sq.	JB-stat	LB-stat	FTSE	REGN	Adj. R-sq.	JB-stat	LB-stat	FTSE	CNT	REGN	IND	Adj. R-sq.	JB-stat	LB-stat
Asia	Korea	0.874***	0.391***	0.475	1146.075***	40.477**	1.245***	>0.000	0.180	382.574***	65.673***	0.937***	0.430***	0.513***	<0.000	0.513	3560.110***	35.792*
		[0.107]	[0.094]				[0.138]	[0.125]				[0.104]	[0.113]	[0.165]	[0.173]			
	Taiwan/China	0.635***	0.276***	0.261	44.735***	24.409	0.767***	0.167**	0.132	37.000***	15.597	0.666***	0.401***	0.640***	0.380***	0.370	127.154***	26.420
		[0.075]	[0.064]				[0.084]	[0.078]				[0.068]	[0.086]	[0.128]	[0.126]			
	China	0.264***	0.570***	0.264	142.377***	41.177**	0.419***	0.934***	0.211	131.583***	15.698	0.456***	0.550***	0.913***	0.463**	0.462	855.056***	19.690
		[0.091]	[0.099]				[0.093]	[0.142]				[0.087]	[0.089]	[0.141]	[0.218]			
	Indonesia	0.294**	0.554***	0.586	239.660***	51.615***	0.563***	>0.000	0.025	152.738***	28.084	0.415***	0.593***	0.741***	>0.000	0.641	734.131***	36.754*
		[0.122]	[0.061]				[0.175]	[0.278]				[0.114]	[0.064]	[0.173]	[0.225]			
	Malaysia	0.285***	0.566***	0.416	139.121***	55.279***	0.574***	0.427***	0.084	836.186***	41.783**	0.356***	0.686***	0.943***	-0.387**	0.602	27.797***	37.552*
		[0.081]	[0.068]				[0.112]	[0.139]				[0.073]	[0.050]	[0.104]	[0.158]			
	Philippines	0.332***	0.383***	0.405	72.728***	35.802*	0.546***	>0.000	0.059	227.649***	29.023	0.394***	0.410***	0.388***	>0.000	0.443	54.253***	27.914
		[0.077]	[0.040]				[0.126]	[0.149]				[0.076]	[0.041]	[0.128]	[0.061]			
	Thailand	0.716***	0.504***	0.327	55.786***	53.237***	1.080***	0.444***	0.116	73.943***	56.666***	0.825***	0.599***	0.901***	>0.000	0.417	130.070***	62.993***
		[0.150]	[0.078]				[0.199]	[0.156]				[0.157]	[0.091]	[0.167]	[0.266]			
	India	0.290***	0.277***	0.215	124.174***	33.792	0.295***	>0.000	0.024	21.840***	33.076	0.383***	0.380***	0.525***	>0.000	0.306	537.946***	34.364
		[0.082]	[0.059]				[0.087]	[0.080]				[0.073]	[0.084]	[0.110]	[0.211]			
	Pakistan	0.147*	0.809***	0.483	72.056***	29.731	0.233**	0.687***	0.095	159.399***	40.719**	0.344***	0.908***	0.943***	0.433***	0.669	103.555***	31.676
		[0.085]	[0.072]				[0.100]	[0.188]				[0.066]	[0.044]	[0.082]	[0.127]			
Europe	Czech Republic	0.625***	0.136**	0.135	2.049	35.376*	0.472***	0.228***	0.172	1.212	33.470	0.526***	0.276***	0.362***	>0.000	0.271	0.210	38.712**
		[0.098]	[0.062]				[0.093]	[0.052]				[0.088]	[0.042]	[0.044]	[0.136]			
	Hungary	0.914***	0.165***	0.271	4.637*	29.590	0.757***	0.212***	0.279	23.611***	30.678	0.758***	0.381***	0.463***	>0.000	0.442	4.142	37.704**
		[0.125]	[0.040]				[0.114]	[0.058]				[0.101]	[0.053]	[0.047]	[0.192]			
	Poland	0.871***	0.375***	0.260	203.697***	60.639***	0.707***	0.296***	0.192	784.377***	41.795**	0.612***	0.664***	0.631***	0.312**	0.566	26.649***	31.396
		[0.123]	[0.077]				[0.116]	[0.084]				[0.103]	[0.066]	[0.054]	[0.130]			
	Russia	0.836***	0.542***	0.449	134.465***	38.838**	0.803***	0.852***	0.304	39.069***	35.196*	0.745***	0.483***	0.387***	>0.000	0.490	181.060***	35.059*
		[0.183]	[0.085]				[0.188]	[0.120]				[0.176]	[0.080]	[0.097]	[0.207]			
	Turkey	0.854***	0.745***	0.505	47.682***	35.045	0.718***	0.634***	0.221	30.392***	34.071	0.460***	0.828***	0.800***	<0.000	0.756	20.862***	29.106
		[0.193]	[0.069]				[0.205]	[0.102]				[0.116]	[0.027]	[0.042]	[0.159]			
Lat. America	Brazil	1.105***	0.371***	0.370	459.111***	44.732**	1.215***	0.179*	0.198	841.882***	42.537**	1.015***	0.403***	0.387***	<0.000	0.400	391.174***	43.900**
		[0.176]	[0.056]				[0.225]	[0.098]				[0.175]	[0.062]	[0.115]	[0.179]			
	Mexico	0.852***	0.497***	0.570	150.562***	30.290	1.168***	0.174**	0.253	301.620***	38.601*	0.706***	0.589***	0.592***	>0.000	0.660	117.563***	30.635
		[0.089]	[0.061]				[0.108]	[0.080]				[0.091]	[0.044]	[0.058]	[0.134]			
	Argentina	0.533***	0.599***	0.455	344.211***	22.723	0.814***	0.391***	0.147	229.113***	34.078	0.446***	0.615***	0.468***	<0.000	0.508	598.781***	26.173
		[0.120]	[0.082]				[0.127]	[0.118]				[0.117]	[0.080]	[0.087]	[0.217]			
	Chile	0.599***	0.134***	0.162	108.610***	49.668***	0.562***	0.125**	0.142	84.738***	45.161**	0.553***	0.242***	0.327***	<0.000	0.211	88.988***	42.887**
		[0.066]	[0.039]				[0.065]	[0.057]				[0.069]	[0.042]	[0.061]	[0.080]			
	Colombia	0.364***	0.855***	0.363	174.226***	40.166**	>0.000	0.507***	0.124	134.104***	39.395**	0.317***	0.844***	0.562***	0.296***	0.485	127.811***	33.224
		[0.082]	[0.082]				[0.085]	[0.095]				[0.077]	[0.062]	[0.076]	[0.111]			
	Peru	0.381***	0.291***	0.094	88.054***	35.593*	0.278***	0.387***	0.095	107.229***	36.008*	0.347***	0.327***	0.420***	0.213**	0.180	72.620***	33.191
		[0.090]	[0.079]				[0.083]	[0.083]				[0.081]	[0.076]	[0.080]	[0.097]			

Appendix D.2

Impact of Value-Weighted [Cumulative] Industry (39 FTSE Industry Sectors), Country, and Regional Factors in Variance of Residuals from ICAPM Model, An EGARCH (1, 1) Model without Leverage Effect, A Sub-Sample of 20 Emerging [Stock] Markets (January 1994 – June 2003)

This table reports the estimated coefficients for each factor, i.e., a world market factor (FTSE), a country factor (CNT), a value-weighted cumulative industry factor (IND), and a regional factor (REGN) from the EGARCH regression model for each country. Standard errors are reported for each coefficient in square brackets, along with some model specification diagnostics. The mean equation is specified as an ICAPM model: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t}$; and, the conditional variance equations are specified as three augmented EGARCH(1,1) processes without the leverage effect. They are: Model I: EGARCH(1,1) + [Country Factor]$_{k,t}$; Model II: EGARCH(1,1) + [Regional Factor]$_{k,t}$; and, Model III: EGARCH(1,1) + [Country Factor]$_{k,t}$ +[Regional Factor]$_{k,t}$ +[Industry Factor]$_{k,t}$ with the assumption that the residuals from the mean equation follow a normal distribution. An EGARCH (1, 1) with the leverage effect is used as the reference model and is reported under column "Benchmark: ICAPM + EGARCH." r_k (r_{FTSE}) is the weekly excess return of country k (a world market portfolio) above a one-week Eurodollar deposit rate. Cumulative industry factors, country factors and regional factors are estimated from a two-stage dummy variable regression of Heston and Rouwenhorst (1994). That is, in the first stage, value-weighted cumulative global industry factors are estimated via the dummy variable regression model, in which both country and industry dummies are considered and weekly, U.S. dollar-denominated industry returns on all available FTSE Industry Sector indices in all sample markets (33) are used. In a second stage, country and regional factors are estimated from the country returns, net off industry factors, via a similar dummy variable regression model, in which only regional dummies are included within a sub-sample of 20 emerging markets. Cap-weights are computed by using market capitalization at the beginning of the synthetic week (Wednesday-to-Wednesday) for each available Industry Sector index within each market. Both adjusted R^2s and Schwartz Bayesian Information Criterion (BIC) is also provided along with each model to compare the effectiveness of four model specifications. Significance at the 1% level is denoted by ***, at the 5% level by **, and at the 10% level by *.

Region	Country	Benchmark: ICAPM + EGARCH			Model I: Country Factor				Model II: Regional Factor				Model III: Country Factor + Regional Factor + Industry Factor					
		FTSE	Adj. R-sq	BIC	FTSE	CNT	Adj. R-sq	BIC	FTSE	REGN	Adj. R-sq	BIC	FTSE	CNT	REGN	IND	Adj. R-sq	BIC
Asia	Korea	1.060***	0.171	-1552.9	1.044***	-0.325*	0.168	-1548.4	1.051***	-1.000	0.169	-1547.0	1.045***	<0.000	-1.000	-1.000	0.165	-1537.1
		[0.084]			[0.090]	[0.222]			[0.086]	[1.015]			[0.093]	[0.262]	[1.006]	[2.554]		
	Taiwan/China	0.696***	0.120	-1753.6	0.683***	-0.888**	0.117	-1748.6	0.684***	1.000	0.118	-1748.1	0.659***	<0.000	1.000	-4.787**	0.113	-1741.0
		[0.077]			[0.081]	[0.444]			[0.077]	[1.385]			[0.084]	[0.511]	[1.518]	[2.341]		
	China	0.262***	0.003	-1645.3	0.255***	1.000	0.001	-1639.9	0.262***	1.000	0.001	-1639.4	0.237***	>0.000	1.000	-7.249***	-0.003	-1634.2
		[0.080]			[0.081]	[0.593]			[0.081]	[0.828]			[0.080]	[0.642]	[0.916]	[2.408]		
	Indonesia	0.264***	0.002	-900.9	0.323***	-0.732***	0.000	-902.3	0.260***	1.208*	-0.001	-895.8	0.242***	-1.214***	2.037**	-4.809***	-0.008	-899.6
		[0.066]			[0.075]	[0.195]			[0.066]	[0.904]			[0.078]	[0.304]	[1.021]	[1.790]		
	Malaysia	0.344***	0.028	-1784.8	0.336***	-2.006***	0.024	-1795.1	0.348***	2.111***	0.027	-1782.6	0.338***	-1.777***	1.000	2.185*	0.019	-1784.3
		[0.060]			[0.056]	[0.310]			[0.059]	[0.596]			[0.056]	[0.334]	[0.740]	[1.540]		
	Philippines	0.435***	0.044	-1178.6	0.470***	-0.850**	0.041	-1175.3	0.438***	1.000	0.041	-1172.8	0.470***	-0.694**	1.000	3.117*	0.037	-1166.3
		[0.076]			[0.081]	[0.364]			[0.075]	[1.309]			[0.090]	[0.389]	[1.260]	[1.929]		
	Thailand	0.624***	0.070	-1274.8	0.632***	-0.496**	0.067	-1271.0	0.625***	-1.485*	0.068	-1271.2	0.639***	-0.630**	-1.730**	-1.000	0.063	-1262.4
		[0.094]			[0.093]	[0.299]			[0.094]	[1.052]			[0.092]	[0.309]	[1.000]	[1.501]		
	India	0.198***	0.013	-1828.4	0.199***	>0.000	0.011	-1821.9	0.200***	-1.000	0.011	-1823.6	0.223***	<0.000	-1.000	>0.000	0.008	-1810.8
		[0.069]			[0.068]	[0.638]			[0.068]	[1.092]			[0.069]	[0.704]	[1.287]	[3.332]		
	Pakistan	0.191**	-0.008	-1507.2	0.189**	0.841**	-0.010	-1502.1	0.176**	-3.624***	-0.009	-1507.4	0.168**	<0.000	-2.755***	-6.051**	-0.013	-1499.4
		[0.100]			[0.108]	[0.467]			[0.097]	[0.928]			[0.101]	[0.572]	[0.992]	[2.700]		
Europe	Czech Republic	0.568***	0.098	-1302.5	0.562***	1.000	0.096	-1297.7	0.550***	-1.642*	0.096	-1298.7	0.542***	<0.000	-2.000	-2.000	0.090	-1287.1
		[0.079]			[0.082]	[0.984]			[0.085]	[1.125]			[0.084]	[1.126]	[1.480]	[4.279]		
	Hungary	0.793***	0.219	-1065.5	0.816***	-1.312**	0.217	-1062.2	0.780***	>0.000	0.216	-1060.2	0.795***	-1.374*	-1.885*	-9.517**	0.209	-1056.4
		[0.073]			[0.076]	[0.749]			[0.076]	[1.104]			[0.075]	[0.848]	[1.318]	[4.739]		
	Poland	0.761***	0.102	-1631.6	0.757***	>0.000	0.100	-1626.6	0.756***	<0.000	0.100	-1626.2	0.733***	0.957**	-0.807***	-4.156***	0.095	-1625.4
		[0.074]			[0.074]	[0.435]			[0.075]	[0.385]			[0.071]	[0.415]	[0.315]	[1.260]		
	Russia	0.783***	0.077	-696.7	0.971***	-1.124***	0.079	-725.9	0.773***	2.030***	0.075	-700.2	0.817***	-1.182***	-1.000	-5.036***	0.068	-702.7
		[0.115]			[0.098]	[0.132]			[0.109]	[0.626]			[0.076]	[0.190]	[0.644]	[1.173]		
	Turkey	0.872***	0.056	-1086.3	0.826***	-0.812***	0.052	-1083.2	0.839***	-1.097**	0.053	-1083.2	0.827***	-0.665**	-1.000	1.000	0.047	-1073.5
		[0.134]			[0.139]	[0.336]			[0.139]	[0.563]			[0.143]	[0.334]	[0.646]	[2.341]		
Lat. America	Brazil	0.946***	0.174	-1416.7	1.147***	-2.455***	0.182	-1465.1	0.984***	-1.842**	0.176	-1412.9	1.171***	-2.489***	-3.076**	4.064*	0.179	-1459.3
		[0.046]			[0.072]	[0.302]			[0.054]	[1.116]			[0.080]	[0.342]	[1.362]	[2.564]		
	Mexico	1.141***	0.237	-1731.2	1.155***	-2.015***	0.232	-1747.5	1.145***	1.936**	0.235	-1727.5	1.152***	-2.090***	-1.000	>0.000	0.229	-1735.5
		[0.065]			[0.074]	[0.277]			[0.069]	[0.939]			[0.075]	[0.358]	[0.989]	[1.980]		
	Argentina	0.907***	0.105	-1561.9	0.975***	-3.151***	0.097	-1581.1	0.916***	1.644*	0.103	-1557.1	0.953***	-3.313***	1.000	-2.601**	0.094	-1571.4
		[0.073]			[0.089]	[0.503]			[0.077]	[1.222]			[0.085]	[0.530]	[0.929]	[1.235]		
	Chile	0.518***	0.126	-2025.6	0.517***	>0.000	0.124	-2019.5	0.525***	1.648**	0.124	-2024.2	0.517***	1.088*	2.476***	>0.000	0.121	-2014.2
		[0.053]			[0.053]	[0.717]			[0.052]	[0.807]			[0.051]	[0.788]	[0.986]	[1.308]		
	Colombia	0.151**	0.003	-1771.5	0.166***	6.797***	-0.003	-1785.2	0.168**	3.524***	0.002	-1771.1	0.166***	6.788***	<0.000	-6.618**	-0.006	-1775.0
		[0.074]			[0.066]	[1.005]			[0.072]	[0.911]			[0.069]	[1.355]	[1.434]	[3.495]		
	Peru	0.165**	0.014	-1805.1	0.165**	<0.000	0.012	-1799.1	0.177***	1.000	0.014	-1799.2	0.174**	<0.000	1.000	2.000	0.009	-1787.9
		[0.073]			[0.073]	[0.624]			[0.074]	[1.249]			[0.075]	[0.632]	[1.282]	[1.695]		

Appendix D.3

Impact of Value-Weighted [Cumulative] Industry (39 FTSE Industry Sectors), Country, and Regional Factors in Variance of Residuals from ICAPM Model, An EGARCH (1, 1) Model with Leverage Effect, A Sub-Sample of 20 Emerging [Stock] Markets (January 1994 – June 2003)

This table reports the estimated coefficients for each factor, i.e., a world market factor (FTSE), a country factor (CNT), a value-weighted [cumulative] industry factor (IND), and a regional factor (REGN) from the EGARCH regression model for each country. Standard errors are reported for each coefficient in square brackets, along with some model specification diagnostics. The mean equation is specified as an ICAPM model: $r_{k,t} = \alpha_k + \beta_k r_{FTSE,t}$; and, the conditional variance equations are specified as three augmented EGARCH(1,1) processes with the leverage effect. They are: Model I: $\text{EGARCH}(1,1) + [\text{Country Factor}]_{k,t}$; Model II: $\text{EGARCH}(1,1) + [\text{Regional Factor}]_{k,t}$; and, Model III: $\text{EGARCH}(1,1) + [\text{Country Factor}]_{k,t} + [\text{Regional Factor}]_{k,t} + [\text{Industry Factor}]_{k,t}$ with the assumption that the residuals from the mean equation follow a normal distribution. An EGARCH (1, 1) with the leverage effect is used as the reference model and is reported under column "Benchmark: ICAPM + EGARCH + LEV." r_k (r_{FTSE}) is the weekly excess return of country k (a world market portfolio) above a one-week Eurodollar deposit rate. Cumulative industry factors, country factors and regional factors are estimated from a two-stage dummy variable regression of Heston and Rouwenhorst (1994). That is, in the first stage, value-weighted cumulative global industry factors are estimated via the dummy variable regression model, in which both country and industry dummies are considered and weekly, U.S. dollar-denominated industry returns on all available FTSE Industry Sector indices in all sample markets (33) are used. In a second stage, country and regional factors are estimated from the country returns, net off industry factors, via a similar dummy variable regression model, in which only regional dummies are included within a sub-sample of 20 emerging markets. Cap-weights are computed by using market capitalization at the beginning of the synthetic week (Wednesday-to-Wednesday) for each available Industry Sector index within each market. Both adjusted R^2s and Schwartz Bayesian Information Criterion (BIC) is also provided along with each model to compare the effectiveness of four model specifications. Significance at the 1% level is denoted by ***, at the 5% level by **, and at the 10% level by *.

Region	Country	Benchmark: ICAPM + EGARCH +LEV				Model I: Country Factor					Model II: Regional Factor					Model III [ICAPM + Country + Regional Factor+ Industry Factor						
		FTSE	LEV	Adj. R-sq	BIC	FTSE	LEV	CNT	Adj. R-sq	BIC	FTSE	LEV	REGN	Adj. R-sq	BIC	FTSE	LEV	CNT	REGN	IND	Adj. R-sq	BIC
	Korea	1.037***	-0.469***	0.166	-1557.3	1.028***	-0.456***	>0.000	0.164	-1550.9	1.028***	-0.461**	>0.000	0.164	-1550.8	1.028***	-0.466**	>0.000	>0.000	-1.000	0.160	-1538.6
		[0.089]	[0.180]			[0.091]	[0.192]	[0.270]			[0.090]	[0.207]	[1.035]			[0.091]	[0.216]	[0.304]	[1.066]	[2.374]		
	Taiwan/China	0.672***	-0.307**	0.117	-1749.9	0.669***	-0.356*	-1.000	0.115	-1744.9	0.665***	-0.360**	1.000	0.115	-1745.1	0.653***	<0.000	<0.000	1.000	-3.959*	0.111	-1735.3
		[0.078]	[0.183]			[0.083]	[0.242]	[0.463]			[0.081]	[0.216]	[1.311]			[0.084]	[0.231]	[0.584]	[1.617]	[2.526]		
	China	0.259***	<0.000	0.001	-1639.6	0.271***	-0.104*	1.038**	-0.001	-1635.1	0.262***	<0.000	1.000	-0.001	-1634.0	0.248***	<0.000	1.000	1.000	-6.836***	-0.005	-1628.4
		[0.080]	[0.071]			[0.078]	[0.076]	[0.629]			[0.081]	[0.076]	[0.876]			[0.079]	[0.095]	[0.742]	[0.960]	[2.593]		
	Indonesia	0.294***	-0.245**	0.002	-898.2	0.321***	>0.000	-0.803***	-0.002	-896.5	0.302***	-0.320**	1.774**	0.000	-894.4	0.227***	<0.000	-0.931***	2.215**	-5.405***	-0.010	-894.4
		[0.074]	[0.124]			[0.078]	[0.172]	[0.337]			[0.074]	[0.168]	[0.935]			[0.074]	[0.240]	[0.376]	[1.029]	[1.883]		
Asia	Malaysia	0.312***	-0.727***	0.028	-1815.2	0.313***	-0.685***	-0.952***	0.025	-1813.4	0.317***	-0.867***	2.174***	0.026	-1814.6	0.318***	-1.000***	<0.000	1.263**	-3.325***	0.023	-1801.9
		[0.061]	[0.148]			[0.061]	[0.159]	[0.338]			[0.061]	[0.188]	[0.737]			[0.060]	[0.398]	[0.310]	[0.669]	[1.316]		
	Philippines	0.438***	-0.332***	0.042	-1179.3	0.445***	-0.271**	<0.000	0.039	-1173.8	0.437***	-0.341***	<0.000	0.039	-1173.4	0.433***	-0.368**	<0.000	>0.000	2.645**	0.033	-1165.4
		[0.078]	[0.116]			[0.079]	[0.117]	[0.390]			[0.079]	[0.121]	[1.107]			[0.088]	[0.159]	[0.422]	[1.158]	[1.478]		
	Thailand	0.637***	-0.456**	0.071	-1277.0	0.632***	-0.580**	>0.000	0.069	-1271.1	0.638***	-0.457**	-1.000	0.069	-1272.9	0.627***	-0.553**	>0.000	-1.000	-2.000	0.064	-1261.5
		[0.083]	[0.235]			[0.083]	[0.324]	[0.460]			[0.083]	[0.232]	[1.003]			[0.083]	[0.320]	[0.477]	[1.073]	[1.714]		
	India	0.214***	-0.443***	0.011	-1829.1	0.215***	-0.446***	1.000	0.009	-1823.3	0.211***	-0.449***	-1.000	0.009	-1824.3	0.219***	-0.456***	>0.000	-1.000	-1.000	0.005	-1811.9
		[0.069]	[0.184]			[0.068]	[0.179]	[0.601]			[0.068]	[0.179]	[1.038]			[0.068]	[0.188]	[0.733]	[1.303]	[3.112]		
	Pakistan	0.187**	-0.170*	-0.010	-1502.4	0.176*	-0.268**	1.498***	-0.014	-1499.7	0.177**	<0.000	-3.236***	-0.011	-1501.7	0.163*	<0.000	>0.000	-2.151**	-5.734**	-0.015	-1494.1
		[0.103]	[0.114]			[0.109]	[0.116]	[0.538]			[0.099]	[0.107]	[1.008]			[0.102]	[0.124]	[0.660]	[1.192]	[2.662]		
	Czech Republic	0.577***	-1.000	0.095	-1298.0	0.569***	-1.000	>0.000	0.093	-1292.4	0.536***	-1.000	-1.950**	0.093	-1293.8	0.558***	-1.000	>0.000	-1.000	-3.000	0.088	-1282.2
		[0.081]	[3.667]			[0.082]	[4.154]	[0.789]			[0.082]	[4.745]	[1.154]			[0.081]	[4.379]	[1.058]	[1.371]	[4.180]		
	Hungary	0.782***	-1.000	0.216	-1067.5	0.787***	-1.000	-1.000	0.213	-1062.9	0.802***	-1.000	1.000	0.214	-1062.9	0.796***	-1.000	<0.000	<0.000	-10.863**	0.208	-1056.1
		[0.075]	[0.805]			[0.077]	[0.839]	[0.715]			[0.078]	[0.890]	[1.232]			[0.074]	[1.275]	[1.039]	[1.632]	[5.297]		
Europe	Poland	0.762***	-0.444***	0.101	-1631.5	0.764***	-0.574***	0.712**	0.099	-1627.6	0.763***	-0.471***	>0.000	0.099	-1625.2	0.731***	-1.000*	1.347***	0.848**	-4.514***	0.094	-1614.1
		[0.073]	[0.171]			[0.072]	[0.236]	[0.423]			[0.072]	[0.173]	[0.382]			[0.060]	[0.643]	[0.458]	[0.384]	[1.640]		
	Russia	0.827***	-1.000	0.079	-701.4	0.787***	<0.000	-1.100***	0.068	-705.4	0.911***	-1.000	0.847**	0.081	-699.9	0.923***	-1.000	-0.635**	<0.000	-2.625**	0.074	-696.8
		[0.117]	[0.949]			[0.084]	[2.163]	[0.357]			[0.115]	[1.066]	[0.456]			[0.120]	[19.779]	[0.361]	[0.652]	[1.576]		
	Turkey	0.849***	>0.000	0.053	-1080.3	0.813***	0.362**	-1.350***	0.045	-1079.8	0.840***	>0.000	-1.357**	0.050	-1078.5	0.826***	0.734**	-1.506***	-1.628**	2.000	0.035	-1074.3
		[0.136]	[0.143]			[0.140]	[0.199]	[0.412]			[0.140]	[0.177]	[0.603]			[0.148]	[0.371]	[0.459]	[0.711]	[2.323]		
	Brazil	1.004***	-0.917***	0.179	-1436.1	1.157***	-0.391***	-1.986***	0.182	-1464.8	1.017***	-0.877***	-1.000	0.178	-1430.4	1.184***	-0.279**	-2.144***	-2.276**	2.000	0.179	-1456.3
		[0.051]	[0.245]			[0.074]	[0.161]	[0.282]			[0.063]	[0.238]	[1.140]			[0.082]	[0.154]	[0.326]	[1.307]	[2.769]		
	Mexico	1.056***	-1.000***	0.235	-1755.3	1.083***	-0.906***	-1.263***	0.234	-1756.8	1.058***	-1.000***	1.000	0.233	-1750.6	1.077***	-0.949***	-1.167***	<0.000	-2.000	0.230	-1745.0
		[0.063]	[0.333]			[0.068]	[0.300]	[0.317]			[0.064]	[0.323]	[0.957]			[0.069]	[0.333]	[0.442]	[1.090]	[2.616]		
	Argentina	0.906***	-0.229***	0.103	-1558.6	0.967***	>0.000	-3.119***	0.096	-1575.1	0.912***	-0.284***	2.418**	0.101	-1555.3	0.948***	<0.000	-3.148***	1.000	-2.447**	0.093	-1565.6
		[0.081]	[0.084]			[0.089]	[0.121]	[0.506]			[0.084]	[0.086]	[1.271]			[0.085]	[0.122]	[0.533]	[0.930]	[1.205]		
Lat. America	Chile	0.503***	-0.310***	0.123	-2025.2	0.492***	-0.352***	>0.000	0.121	-2019.2	0.515***	-0.574**	2.544***	0.122	-2029.8	0.502***	-0.999**	1.148*	3.288***	-2.545**	0.117	-2020.3
		[0.055]	[0.117]			[0.054]	[0.117]	[0.752]			[0.051]	[0.257]	[0.693]			[0.048]	[0.556]	[0.791]	[0.859]	[1.360]		
	Colombia	0.161**	-0.190**	0.002	-1767.3	0.176***	-0.333***	7.980***	-0.008	-1785.6	0.166**	-0.238***	3.958***	-0.001	-1768.8	0.134**	-0.898***	7.832***	1.000	-10.217***	-0.012	-1781.1
		[0.076]	[0.098]			[0.067]	[0.119]	[1.272]			[0.075]	[0.092]	[0.924]			[0.074]	[0.233]	[1.534]	[1.093]	[2.242]		
	Peru	0.173***	-0.436**	0.014	-1805.8	0.172***	-0.428**	<0.000	0.011	-1799.8	0.200***	-0.536**	2.201*	0.014	-1802.0	0.194***	-0.558**	<0.000	2.241*	2.000	0.009	-1790.8
		[0.072]	[0.195]			[0.072]	[0.194]	[0.590]			[0.076]	[0.231]	[1.347]			[0.078]	[0.255]	[0.608]	[1.381]	[1.571]		

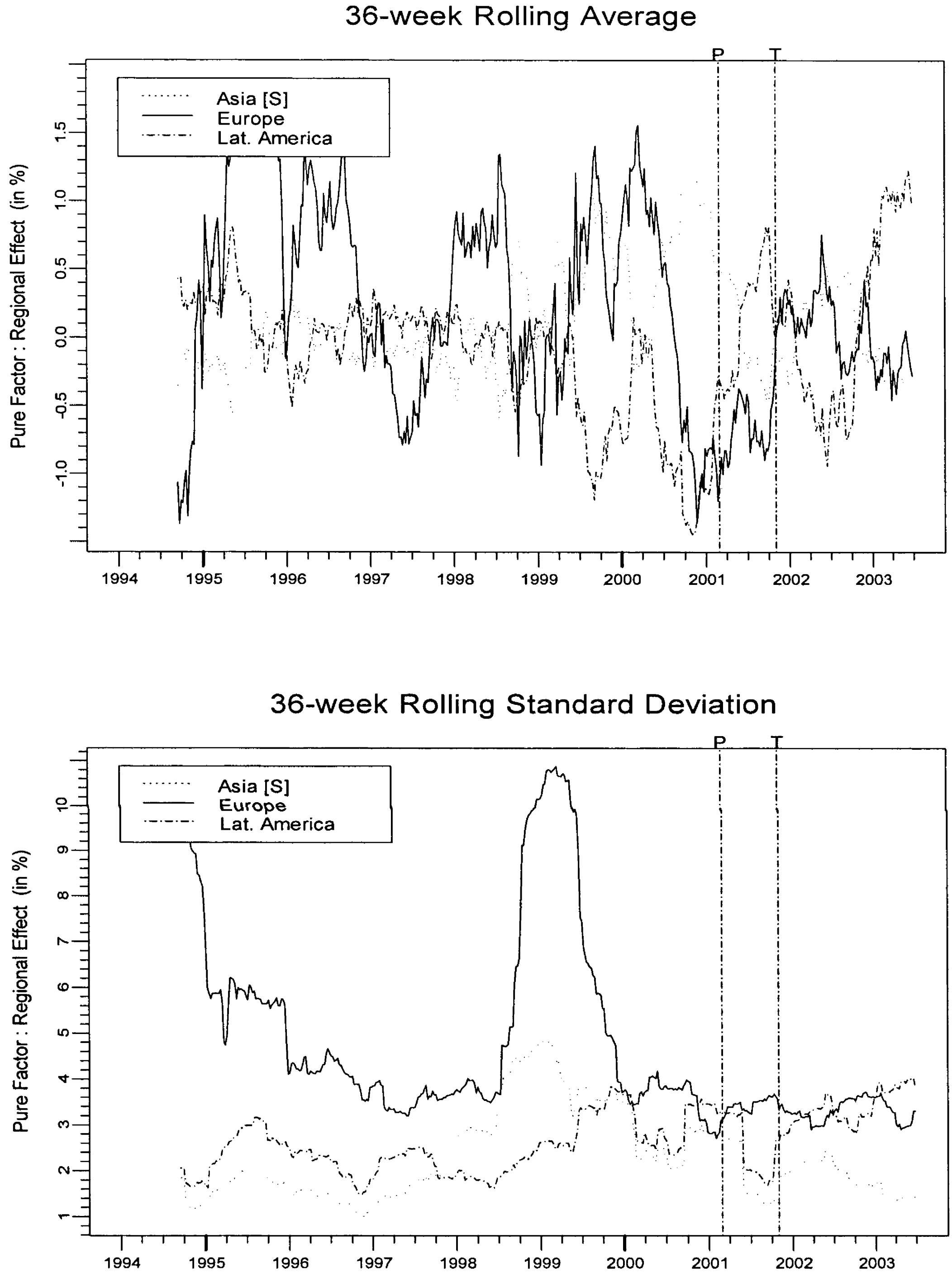
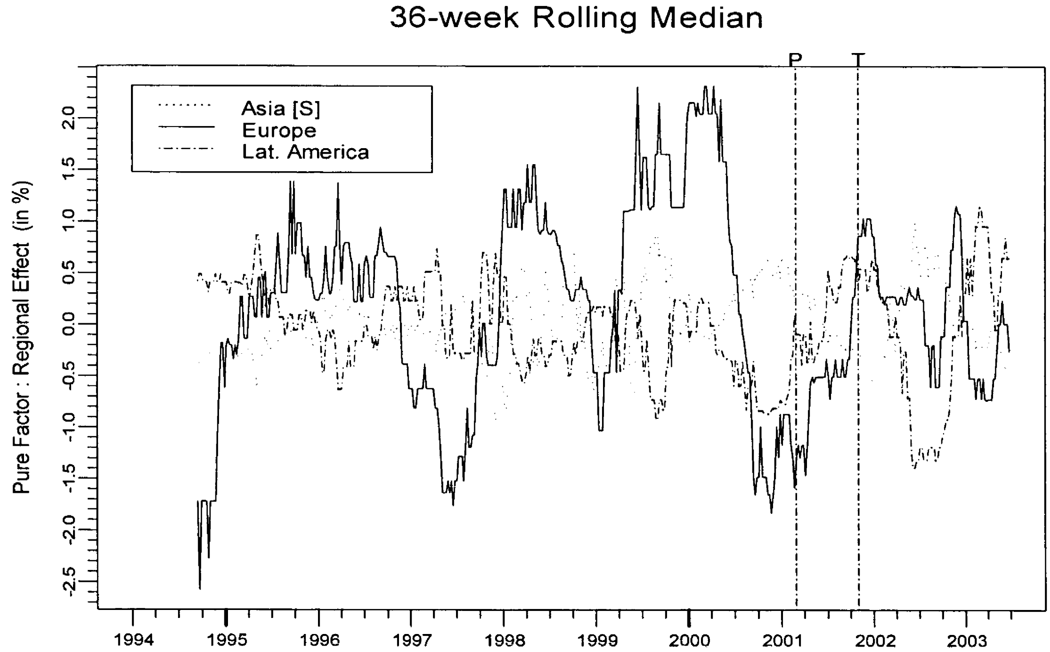


Figure D.1. 36-week rolling averages and standard deviations of regional factors estimated from industry returns on 39 FTSE Industry Sectors available in 20 emerging markets during the period 1994 – 2003.

In these plots, industry, country, and regional factors are aggregated as the cross-sectional averages of absolute values of the estimated factor loadings for all 39 FTSE Industry Sectors, 20 emerging markets, or 3 regions. Within each rolling window, means and standard deviations are computed for each aggregate factor. "P" and "T" denote the peak and trough dates of the U.S. business cycles as identified by National Bureau of Economic Research during 1994 - 2003.



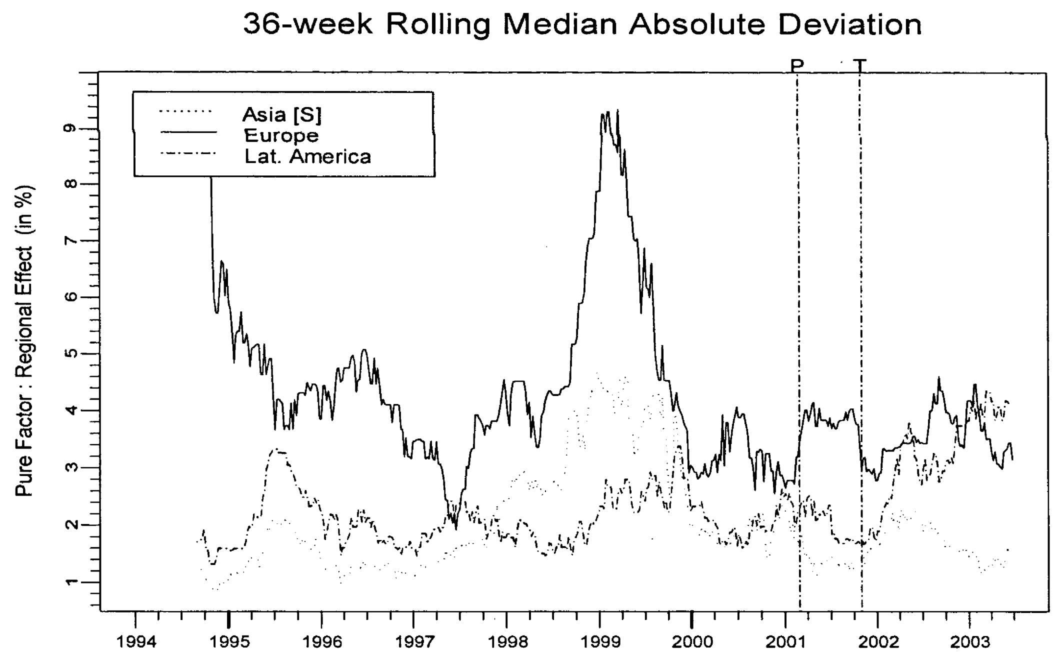


Figure D.2. 36-week rolling medians and MADs of regional factors estimated from industry returns on 39 FTSE Industry Sectors available in 20 emerging markets during the period 1994 –2003.

In these plots, industry, country, and regional factors are aggregated as the cross-sectional averages of absolute values of the estimated factor loadings for all 39 FTSE Industry Sectors, 20 emerging markets, or 3 regions. Within each rolling window, medians and MADs (center is defined as median) are computed for each aggregate factor. "P" and "T" denote the peak and trough dates of the U.S. business cycles as identified by National Bureau of Economic Research during 1994 - 2003.

APPENDIX E

Anonymous Examiners' Reports

EXAMINER'S REPORT

A Comparative Study of Industry Factors in Emerging and Developed Stock Markets
Hua JIN

Faculty of Economics & Commerce
The Australian National University

Recommendation: The thesis should be unconditionally accepted for the award of MPhil. The candidate may wish to run a spell-check and correct the odd typo but that should be the candidate's choice. I do not believe it necessary for there to be any amendment to the current submission.

Overview

The topic essentially concerns variants on traditional (international) asset pricing tests with a focus on the role of industry factors (versus country factors) as explanators of return variation. The extension to create a comparison between emerging and developed markets is a highlight of the contribution of the thesis. The literature in the area is relatively contemporary, and as such, then candidate has selected a challenging topic.

The expression, language and grammar are all at a high standard. Indeed, given the candidate's background, I suspect that there was much hard work in getting drafts up to the standard and this reflects very well on the dedication and patience of both student and supervisor.

The main contribution of the thesis is found in the empirical work, essentially contained in Chapters 5 and 6. These are high quality chapters, underpinned by a considerable amount of data analysis and sophisticated modelling. The work in these chapters exceeds the standard required for a masters thesis. Indeed, with further extensions, this thesis had the capacity to develop into a PhD dissertation. The standard in these chapters is the basis for my recommendation that the thesis be judged as more than satisfactorily fulfilling the requirements for the award of the degree.

I offer a number of comments below, perhaps some are overly critical. However, they are made in a constructive spirit and should not be viewed as detracting from what is overall a high quality thesis.

Commentary

The thesis is well set-up by a thorough and current literature review. Indeed, for a masters thesis, this review is exceptionally comprehensive. My only criticism here is that the discussion does not really focus on why industries are different (sect 2.5). The discussion focuses on how different industry structures can impact on country returns, but it does not delve into explanations of economic forces as to why different industries may perform differently at varying points in time. The relevance of this point becomes clearer when put in the context of business cycles (see research question 2 on page 5). As one example, how does an oil risk premium (differentially) impact on industries?

The discussion of the empirical research in the literature review was very thorough. However, I could not find any clear mention of the problem of endogeneity. That is, are country returns different because of their industry structure? Or is the apparent industry effect driven by the country effect? The text made the point about having to disentangle these effects and effectively introduce orthogonality into the empirics, but never really focussed on the underlying rationale of this 'big picture' question.

The discussion of the method in chapter 3 demonstrates a high level of understanding of what is quite a complex area. Without detracting from the overall quality of the thesis, a general problem encountered in the subject area is that the researcher is ultimately reliant on the industry classification adopted by the various commercial data suppliers. There is an implicit assumption that the industry groups actually accurately capture each 'industry', when in reality we know that industry classifications are blurred. I recognise that this problem is partially addressed in the empirics through analysing two different classification schemes. Nevertheless, the issue remains problematic and perhaps should have been further discussed.

In the EGARCH model, I follow the argument as to why a time-varying approach (with leverage effects) is adopted. However, I do not follow why the factors need to be incorporated in both the conditional variance and the conditional mean. The lead-up discussion concentrates on why returns may be influenced by the various factors, but it does not follow why (conditional) variance should be similarly influenced. Perhaps, in this regard, the model could be criticised for over-specification.

In section 4.3.1 and the conclusion, the sample period is described as a "relatively volatile period". I disagree. In the context of stock market history, the period of the study has been a relatively stable period. While there have been a few episodic events, generally the practitioner view is one of stability. But this is a minor quibble.

As a point of presentation, the descriptive statistics in Chapter 4 and the early part of Chapter 5, while extremely thorough, could have been reduced. These sections occupy almost 50 pages and add to an already large thesis. Perhaps on reflection, some of this material could have been moved to an appendix.

I have little in the way of substantive comment to make on the empirical analysis and the associated discussion of results. This discussion and presentation is again extremely thorough. Perhaps the text tended to get bogged down with minor detail, thereby taking the reader away from the overall picture that emerges.

Note that the graphs in Chapter 6 were hard to discern the three regions (I could only make out two regions). Similar comments apply to the latter graphs that use the three factor sets.

The business cycle analysis did not add substantially to the research. In part, we know that expansionary periods have become longer over time, and we know that the NBER classification (while arguably the best around) is fairly crude. Moreover, the stock market is a leading indicator of business cycles, thus the use of an index that has the stock market level as an input to subsequently analyse aggregate stock price changes appears to suffer from a circularity in logic. (Although, I would need to think further on this before making serious comment.) Notwithstanding, given that these results are mixed, I believe that this analysis will be hard to 'sell' to a journal referee.

As a general comment, the thesis extends itself to regional factors (or influences). This is a personal bias, but I doubt whether this analysis stands up particularly well. Indeed, as acknowledged in the conclusion, the grouping strategy is somewhat ad-hoc and could be criticised for over-analysing the data. The thesis has a global factor, then delves into country analysis and then examines industry factors. To revert back to regional factors appears overkill. The question really is what influence should a region have over and above country and industry factors? I cannot think of a compelling argument. However, in investigating this question, the thesis again demonstrates its thoroughness.

In summary, well done on a very good piece of research.

Comments on "A Comparative Study of Industry Factors in Emerging and Developed Stock Markets" – by Hua Jin

Comments:

This Masters thesis examines the issues surrounding the importance of industry factors in developed and emerging markets. While it is a carefully crafted thesis and provides a good overview of literature, at 325 pages it is far too long for a Masters thesis. It could have addressed all stated objectives in a condensed fashion. The thesis should yield several good papers/publications. My general comments are outlined below:

- On pages 60 – 63, Mr. Jin discusses the EGARCH model, but does not say why it is relevant in studying industry factors. How does volatility tie in with industry factors?
- With regard to business cycle effects, it may not just be that the US business cycle only has an impact, but rather the synchronization or the lack thereof, of the business cycle of the emerging (developed) market with that of the US could impact on industry factors.